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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NINETY-NINTH CONGRESS

SECOND SESSION

ON

S. 2199

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 1987 FOR THE ARMED FORCES PROCUREMENT, FOR RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, FOR OPERATION AND MAINTENANCE, AND FOR WORKING CAPITAL FUNDS, TO PRESCRIBE PERSONNEL STRENGTHS FOR SUCH FISCAL YEAR FOR THE ARMED FORCES, AND FOR OTHER PURPOSES

PART 4

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JANUARY 30; MARCH 14, 20, 25; APRIL 10, 24

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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

THURSDAY, JANUARY 30, 1986

U.S. Senate,
Subcommittee on Strategic
and Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

ANTITACTICAL BALLISTIC MISSILE [ATBM] DEFENSES

The subcommittee met in open session, pursuant to notice, at 10:35 a.m., in room SR-253, Russell Senate Office Building, Senator Dan Quayle presiding.

Present: Senators Warner, Cohen, Quayle, Wilson, Exon, and Levin.

Staff present: Robert F. Bott, Robert G. Bell, Douglas R. Graham, William E. Hoehn, Jr., George K. Johnson, Jr., Judith A. Freedman, professional staff members; Russell C. Miller, research assistant; and Karen A. Love, staff assistant.

Also present: Romie L. Brownlee, assistant to Senator Warner; James M. Bodner, assistant to Senator Cohen; Henry D. Sokolski, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Janne E. Nolan, assistant to Senator Hart; and Jeffrey B. Subko, assistant to Senator Exon.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. The subcommittee convenes in open session this morning to receive testimony from public witnesses on military issues associated with antitactical ballistic missile defenses. This hearing was scheduled at the specific request of my colleague from Indiana, Senator Quayle. I will ask Senator Quayle to assume the chairmanship of this subcommittee at the conclusion of my opening statement out of respect for his initiative.

The subject of the antitactical ballistic missile [ATBM] defenses has been of continuing interest to this subcommittee and in particular Senator Quayle, myself, and others. The threat posed to many high value NATO targets by Soviet tactical ballistic missiles is quite clear.

This subcommittee will look with interest at the efforts underway to address this threat in connection with its review of the fiscal year 1987 defense budget request.

An ATBM system could be developed and deployed in a manner fully consistent with the ABM Treaty. Thus, it might be a promising option for early deployment in Europe to defend the high value NATO targets that currently are vulnerable to attack by Soviet tactical ballistic missiles armed with a variety of warheads.

Some of our allies have already made statements indicating their interest in this issue. Thus, it would seem that an ATBM program provides an excellent opportunity for cooperation with our allies under the SDI Program.

On behalf of the subcommittee, I would like to welcome our witnesses this morning. Mr. James Woolsey was formerly Under Secretary of the Navy and is currently serving as a member of the Packard Commission.

Mr. Dennis Gormley is the assistant vice president for military operations and policy analysis at the Pacific-Sierra Research Corp.

The subcommittee is very appreciative of the willingness of public witnesses to take time out of their personal schedules to testify before us. Following the opening statement from our colleague and other colleagues present this morning, we will receive this testimony.

Senator Quayle, why not step up here and take the chair.

Senator QUAYLE [presiding]. Thank you very much, Mr. Chairman, and I want to thank you very much for having these hearings. I have a prepared statement that I will insert in the record.

[The prepared statement of Senator Quayle follows:]

PREPARED STATEMENT OF U.S. SENATOR DAN QUAYLE

Mr. Chairman, I want to thank you for holding this hearing today. I originally asked for this hearing because of my concern that we have not paid sufficient attention to the threat that new, accurate, non-nuclear Soviet ballistic missiles are beginning to pose to our allies and our forces abroad.

Soviet SS-21, SS-22 and SS-23 missiles are or will soon be deployed against our troops and allies in Europe, the Middle East and Asia. Because of their current and projected accuracies, these missiles may make it possible for the Soviets to disarm our forces and allies without having to resort to nuclear weapons.

In Europe, this means that our military storage sites, our command and control centers, our main air bases, our air defenses, our nuclear storage sites and our theater nuclear weapons systems would all be knocked out in the initial minutes of war. All of this could be done without passing the nuclear threshold and with no or only minimal civilian casualties. It would reduce the costs of follow-on attacks by Warsaw Pact air forces and armor. Indeed, some experts contend that with surprise missile attacks, Warsaw Pact follow-on strikes could be accomplished with little or no mobilization of reserve forces.

In the Middle East, these same Soviet missiles are now beginning to be deployed. Syria now has SS-21s that can reach Israeli airfields. The Israelis have no defense against these missiles other than finding them and destroying them first. As in the NATO case, this is hardly a prescription for stability.

In Asia, the Soviets are certain in the next few years to replace their existing Frog, Scud and Scaleboard missiles with SS-21s, SS-22s and SS-23s. These missiles will put much of South Korea and Japan within range of non-nuclear attacks that could disable U.S. command and control facilities, air fields and critical pre-positioned war goods. Currently, there is no defense in the Far East against such attacks.

What should be done? First, it is important that the character of this emerging threat be aired and understood in hearings such as this one.

Second, we need to reevaluate our favorite solutions to Soviet ground warfare. Counter-offensive efforts such as Counter Air 90 and Deep Strike may be part of the answer to the Soviet tactical missile threat, but even counter-offensive weapons may be vulnerable to attack. More important, even if they should survive initial attack, it is not clear that they would be able to locate the Soviet missile launchers since they can be moved minutes after being fired. It also is unclear if our counter-offensive missiles and planes could survive Soviet air and tactical missile defenses such as the SA-10 and SA-12.

As for passive defense, we hardly have enough. Hardening against missile attacks requires more than hardening against attacks by planes. Nor should we rely very much on dispersal of our air forces and nuclear systems since dispersal can only occur if and when NATO as a whole agrees to disperse and because dispersal itself is considered to be provocative.

The third effort that needs to be made, then, is to consider what new passive defenses might be devised and how they might work in tandem with counter-offensive forces and, most importantly, with anti-tactical ballistic missile systems. To date, there has been no analysis of what the trade-offs might be between anti-tactical ballistic missiles, counter-offensive forces and passive defense. If our passive defenses are improved, might we get by with an anti-tactical ballistic missile system that is less than 100 percent effective? If we have good passive and good active defenses, might we need fewer counter-offensive forces? What can't passive defenses protect? What is the minimum level of protection our forces must have to dissuade the Soviets from thinking that they could overwhelm NATO in a surprise attack?

Finally, we need to pursue development of an anti-tactical ballistic missile system and establish a program element for this work. I believe the services are close to doing this, but they and our allies should be encouraged further. The Soviet tactical missile threat will certainly not decrease, and we have too much invested in protecting our forces and those of our allies to ignore it.

Senator QUAYLE. I believe that we have really paid too little attention to the growing ballistic missile threat that we are being faced with, not only in Europe but also in Korea, Japan, and the Middle East.

The Soviets' short range ballistic missiles have a conventional and chemical capability that I believe alter or could possibly alter some of the strategies that we have been relying upon in the past, particularly in NATO.

There are a number of things that we can do to meet this threat. There is the option of developing passive defenses, hardening, things like that. There is the option of dispersal, moving targets around.

We also can look at active defenses, and I believe that our two witnesses today are very capable of addressing this very important issue.

Senator Warner and I just came from a meeting with our NATO allies. I brought up this issue, and I think that, as Chairman Warner pointed out, this is possibly an area of cooperation in SDI, that we can work with our NATO allies.

As a matter of fact, I really perceive and anticipate that perhaps the first deployment of an SDI-type of defense will not necessarily take place in this country but will take place in Europe. It will take place in Europe because of the threat with the SS-21's, the SS-22's and SS-23's.

So I think that as we address this threat, these two witnesses, Mr. Woolsey and Mr. Gormley, that we will certainly be looking for their ideas.

I also want to call to the attention of the subcommittee the very excellent testimony of Thomas Dine and Doug Broomfield on the ballistic missile threat. It says a defense against tactical ballistic missiles would significantly enhance Israel's security, so this is not just a NATO issue. This is an issue that goes beyond the confines of NATO.

I think our direct attention today will obviously be focused on NATO and what we can possibly do. These missiles are far more accurate and have far more hard target kill capability than the Frog or the Scud or the Scaleboard that we have seen in the past, so it is certainly an issue that I am very interested in and with which I have been very concerned.

I applaud the leadership of our chairman for holding these hearings and look very much forward to the testimony.

Senator WARNER. Senator, I would suggest that you clarify the receipt before the subcommittee of the testimony from Mr. Dine. You invited the testimony and they will not be present, but it will be made a part of the record.

Senator QUAYLE. That is correct. The entire testimony will be part of the record. (See p. 1428.)

Senator Wilson, do you have any opening comments?

Senator WILSON. Mr. Chairman, I will not take the subcommittee's time any longer than is required for me to concur in the statement of Senator Quayle. I share in his gratitude to you for conducting these hearings. I think that they are fully as important as he has indicated.

We are dealing with a development of the greatest import, particularly to our allies in the Middle East and in Europe, and with that I will eagerly listen to the witnesses and thank them for being with us this morning.

Senator QUAYLE. OK. Mr. Gormley, would you like to proceed?

STATEMENT OF DENNIS M. GORMLEY, ASSISTANT VICE PRESIDENT FOR MILITARY OPERATIONS AND POLICY ANALYSIS, PACIFIC-SIERRA RESEARCH CORP.

Mr. GORMLEY. Thank you, Senator. It is a distinct pleasure to appear before this subcommittee to discuss a widely overlooked dimension of Soviet theater forces that is certain to confront NATO decisionmakers with hard choices in defense planning, at least over the next decade.

I performed research on this subject during 1984 while I was a research associate at the International Institute for Strategic Studies in London. The views expressed here are exclusively mine.

Many Western analysts have been quick to challenge NATO's consideration of highly accurate conventional missiles for deep strike attacks on Warsaw Pact airfields and second-echelon divisions. Critics view these advanced weapons as a serious threat to crisis stability, in that they must be used early and quickly in a war to achieve their intended effect.

But what of highly accurate, deep-strike conventional missiles in the arsenal of the Warsaw Pact, which openly avows to an offensive warfare strategy? The conventional wisdom is that a technologically inferior U.S.S.R. badly trails the West in emerging conventional technologies.

Many are surprised to learn, however, that the Soviet Union has already deployed its first highly accurate conventional missiles in Eastern Europe. Tied to an offensive strategy emphasizing the preemptive employment of massive numbers of high performance aircraft, these new short-range missiles, the SS-21, SS-22, and SS-23, presage an emerging set of Soviet attack options that promise, by the start of the next decade, to turn currently debatable shortcomings in NATO defenses into clearly dangerous deficiencies.

Two reasons account for belated recognition of this emerging short-range missile threat. First is the West's preoccupation with the Soviet SS-20 missile force, which has been the central focus of the intermediate nuclear force negotiations in Geneva.

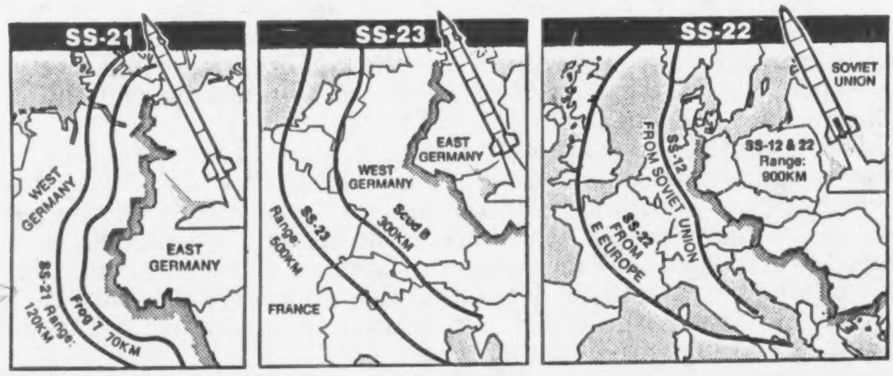
Equally important is the way in which Western officials characterized Soviet short-range missiles when Moscow used them to retaliate against Pershing and cruise missile deployments. The Kremlin's retaliation included the deployment of enhanced-range tactical missiles in East Germany and Czechoslovakia.

Rather than worrying aloud about the serious impact of these developments and granting Moscow political capital, Western officials instead represented the new generation of Soviet short-range missiles as nothing new, or simply a long overdue, routine modernization of Soviet tactical nuclear missiles which have been in Eastern Europe for years.

But the Soviet Union's new missiles have a far more serious dimension. NATO has little strategic depth. Most of its highest value military installations, including nuclear weapon sites, airfields, air defense site and reinforcement facilities, a few hundred in number, are within 500 kilometers of the inner-German border. Based in Eastern Europe, new enhanced range Soviet missiles could easily cover most of these targets, as the accompanying illustration to my testimony shows.

More important, major improvements in missile accuracy and conventional warhead effectiveness suggest that once the new generation of short-range missiles is fully deployed, such attacks could be conducted without the immense escalatory risk of a nuclear attack.

Figure 1. Range Arcs of New Soviet Missiles Stationed in Eastern Europe.



NATO's inviting vulnerabilities are nothing new. NATO has always been susceptible to Warsaw Pact nuclear attack. What is new is an emerging set of Warsaw Pact conventional attack options that could dangerously lower Soviet risk calculations in a future European crisis.

The Soviet Union is by no means invulnerable. Several prominent weaknesses, among them the questionable reliability of the

U.S.S.R.'s reluctant allies, command and control inflexibility under rapidly changing circumstances, and shortcomings in theater reconnaissance capabilities, would probably combine to render any Soviet prospects for a sustained offensive highly uncertain.

Ironically, however, the convergence of these Warsaw Pact vulnerabilities with the Soviet Union's emerging attack options make the Pact more, not less, ominous an adversary, especially in uncertain crisis situations. Perhaps the best way for Soviet planners to reconcile Warsaw Pack weaknesses is through the achievement of decisive results preemptively in the first campaign of a future war, before events can get out of hand.

The Soviets began new tactical missile development programs in earnest in the early to mid-1970's, and the 120-kilometer range SS-21 started to replace the 70-kilometer range Frog in Soviet divisions in East Germany beginning in late 1981.

The front-level 900-kilometer range SS-22, which replaces the SS-12 Scaleboard missile of similar range, appears to be the missile system Moscow moved into East Germany and Czechoslovakia in retaliation for NATO's deployment of Pershing and cruise missiles.

While many have downplayed the military significance of this move, forward-based SS-22's do extend Warsaw Pack tactical missile coverage to nearly all of the NATO central region's rear area.

Equally significant, the SS-22's forward movement denies NATO intelligence authorities valuable early warning information that would otherwise have resulted from the prewar movement of SS-22's from the Soviet Union into Eastern Europe.

The newest Soviet shorter range ballistic missile, the SS-23, is scheduled to replace the Scud missile. The 500-kilometer range SS-23 furnishes Soviet army and front commanders an additional 200 kilometers of targeting flexibility over the Scud. If the deployment of the SS-23 in Eastern Europe begins in 1986, all Soviet armies and fronts in Eastern Europe would probably not be equipped with this new missile until the early 1990's.

The quantitative dimension of Soviet shorter range missiles is also undergoing change. As new development programs have yielded substantial improvements in missile quality, there has been a corresponding increase in the number of launchers available to Warsaw Pact divisions, armies and fronts.

Most recently, for example, selected army and front missile brigades began expanding their launchers from 12 to 18. Altogether, there has been a tripling of initial delivery capability over the past two and a half decades. To support the nearly 700 launchers deployed with Warsaw Pact forces in Eastern Europe—better than half of which are with Soviet units, plus another 900 launchers in the Soviet Union—the U.S.S.R. produces an estimated 300 to 350 new shorter range missiles each year.

In range capability alone, the SS-22—a so-called short range missile—can attack over 85 percent of NATO targets assigned to the SS-20, while the SS-23 could target as much as 50 percent of European NATO. But it is not the nuclear coverage of these new missiles that is so worrisome. Rather, it is their critical contribution to a Soviet blitzkrieg conventional strategy in Europe.

Preventing NATO from employing nuclear weapons, the threat that constitutes the heart of NATO strategy, is the central objective of Warsaw Pact conventional strategy. Should deterrence fail, Soviet planners envision a decisive period of conventional operations causing a rapid collapse of Western defenses, especially NATO's ability to escalate to the nuclear level.

The Soviet operational concept entails the employment of division- and perhaps army-sized operational maneuver groups [OMG's] to prevent NATO from organizing a coherent, indepth defense. Emphasizing surprise and high-speed advances, OMG's would attempt to penetrate deep into NATO's rear to disrupt or destroy nuclear weapons, aircraft, logistic support, command and control centers, and reserve and withdrawal forces.

Success would depend on several important variables, most critically winning the air campaign. The air operation would be expected to disrupt NATO's air defense network to enable friendly fighter-bombers, helicopters, and transport aircraft to accompany or follow OMG penetrations. Airborne and helicopter assaults simply cannot be executed until the air battle is won.

Many skeptical Western analysts question whether the Warsaw Pact could achieve the air superiority needed to enable deep raids between NATO's forward lines and whether a Soviet junior officer corps, practiced in conformity to predetermined war plans, possesses the initiative and flexibility to react decisively under such complex battle conditions.

However legitimate, these questions focus on the kinds of contingency the Soviet Union least prefers: one in which NATO has had sufficient time to mobilize its superior military potential. Soviet military planners share the skeptics' doubts over Warsaw Pact prospects under these conditions. Their solution lies in exploiting what Soviet planners call the "initial period of war," when the number of installations or targets that must be attacked to achieve decisive results is relatively small compared with the targeting requirements of the postmobilization period.

A short, decisive campaign also helps to compensate for shortcomings in the flexibility of the officer corps' lower ranks—through intensive preplanning—and the uncertain reliability of the Soviet Union's Warsaw Pact allies—as a short war reduces their opportunities to opt out.

What are the constituents of this decisive, preemptive attack during the initial period of war? Much attention has focused on the role of Soviet frontal aviation in conducting a massive conventional air operation against NATO's nuclear forces, command posts and airfields at the beginning of hostilities.

Overlooked is the critical role new shorter range missiles would play in supporting such operations. The air operation, for example, entails employing large numbers of penetrating aircraft supported by airborne, air assault and special purpose troops. Without the support of new conventional ballistic missiles, the Warsaw Pact would need to assign a high percentage of their first-wave aircraft to NATO air defense missile sites to open up penetration corridors for subsequent waves of aircraft.

While aircraft would be subject to unpredictable attrition, conventional missiles currently are far more assured of penetrating to their targets. Missile attacks on air defenses would free up the majority of aircraft to perform their primary mission: neutralizing

NATO's theater nuclear weapons, command and control, and reinforcement links with the United States.

Subsequent missile attacks could further aid the air battle by pinning down NATO aircraft and nuclear dispersal activities, thereby increasing their vulnerability to subsequent air strikes.

Only with the achievement of air superiority can Warsaw Pact planners confidently expect operational maneuver groups to succeed in penetrating deep into NATO's rear areas to prevent the alliance from organizing a coherent, indepth defense.

New Soviet conventional ballistic missiles will offer Warsaw Pact attack planners numerous attack options against NATO's soft, vulnerable central region. While time does not permit a full elaboration of the vulnerability of all the principal targets of interest to Warsaw Pact planners, I have just a few remarks about one: NATO's nuclear weapons.

For the NATO central region—West Germany, the Netherlands and Belgium—the target set comprises roughly 50 nuclear storage sites, 10 airbases with dual-capable fighter-bombers and collocated nuclear bombs, and roughly 20 garrisons housing Pershing, Lance and ground-launched cruise missile systems.

But Soviet planners do not view each of these 80 installations with equal gravity, because they select the main nodes in various target sets for priority attention. Plausibly, the most threatening of the 50 nuclear storage sites—for example, those stockpiling Pershing and GLCM warheads—and missiles and aircraft on quick-reaction alert status might be singled out for special attack consideration.

The vulnerability of NATO's nuclear deterrent is most sensitive to whether Western decisionmakers act in time to disperse nuclear weapons, aircraft, and missiles from their peacetime bases. For example, dispersal in the central region would render Soviet preemptive strike calculations dubious at best by multiplying the nuclear target set from 80 fixed installations to hundreds of mobile, and thus more survivable, field units.

For this reason, many view the rapid achievement of nuclear dispersal as the most sensible course for NATO decisionmakers; such an act would at once produce substantially greater survivability for nuclear forces and lessen pressures for early nuclear use.

Others are not so sanguine, They deem the alert and dispersal of nuclear weapons so provocative as to create uncontrollable incentives for the Warsaw Pact to attack in a crisis. Critics maintain that nuclear dispersal provokes attack because the widespread distribution of nuclear warheads throughout NATO forces is fundamentally no different than a delegation of authority to lower level military authorities to use such weapons.

A complicating factor is the lengthy time it would take to complete nuclear dispersal. Because of the perceived sensitivity of nuclear alerts, NATO forces are not practiced in their execution. Preparing, outloading and dispatching large numbers of nuclear weapons could take nearly a full day.

Most important, nuclear force survivability is materially threatened during dispersal, a process which exposes many weapons and places truck convoys, handling equipment and personnel at risk.

Even light conventional missile attacks would do enormous damage during this period simply by delaying the dispersal process.

How might a force of new conventional missiles support wartime Soviet strategy? For illustrative purposes, let us consider how 274 short range missile launchers might be employed in the opening minutes of a future war. This number of launchers roughly approximates those launchers that could plausibly be organic to Soviet—vice non-Soviet Warsaw Pact—missile units in East Germany and one SS–22 brigade in Czechoslovakia, by 1990. Principally, I would foresee their use in direct support of the massive air operation. Soviet planners might choose to suppress half of NATO's air defense belts in the central region by employing two missiles per air defense battery to achieve the Soviet damage criterion for area targets called neutralization, or roughly 10 to 30 percent area coverage.

The first salvo could also include attacks against the 10 interceptor airfields, with 6 missiles per airfield needed to cut the main runway and taxiway, and against the 5 control and reporting centers—2 missiles each—that link surveillance, warning, and air defense assets.

Disrupting airfield operations for a minimum of several hours would facilitate followup bombing missions by frontal and strategic aviation against pinned down NATO aircraft. The overall attack would require the expenditure of around 200 of the 274 first-salvo missiles.

Alternatively, should NATO decisionmakers delay outloading and dispersal of nuclear weapons, a Soviet planner might choose to expand a portion of the initial salvo on high priority nuclear storage sites, missile garrisons, and quick reaction alert sites supporting Pershing II and GLCM, with 2 missiles assigned against each of those 25 targets, as well as against the 10 airfields in the central region which support dual-capable aircraft. This portion of the attack would require the expenditure of 110 missiles, leaving 164 to suppress NATO's air defenses.

The purpose of the attack against the nuclear target set would be simply to disrupt and delay an already cumbersome process, which depends heavily on the availability of extremely vulnerable handling equipment and transport vehicles. Delaying outloading by several hours increased the probability that penetrating aircraft will succeed in destroying these important targets before they disperse to seek cover.

Subsequent missile salvos could then be employed to interrupt NATO's capability to generate aircraft sorties by cratering runways and destroying maintenance and munitions stores and to support OMG and airborne penetrations deep behind NATO's forward lines.

NATO planners must now begin considering what difference several hundred Soviet missile launchers, capable of delivering perhaps 1,000 highly accurate conventional missiles will make in calculating the conventional balance of forces. And these launcher and missile numbers only account for the front formed out of the Group of Soviet Forces Germany, plus one SS–22 brigade in Czechoslovakia. They do not include missile launchers organic to Soviet follow-on divisions and armies of the second operational and strategic echelons, nor to non-Soviet Warsaw Pact missile units.

The important point, however, is that conventional ballistic missiles represent a brandnew factor. Unlike high performance Soviet aircraft against which NATO is investing heavily in modernized air defenses, ballistic missiles are currently assured of penetrating to their targets save for faulty missile performance.

Successful suppression of selected portions of NATO's air defenses by conventional ballistic missiles would enable Soviet aircraft to conduct interdiction strikes in NATO's rear area with greatly reduced attrition.

NATO should immediately consider suitable hedges against this emerging threat. Several possible countermeasures, includng suppressive fire against Soviet missile launchers and improved dispersal of NATO's tactical nuclear weapons and aircraft, are worthy of consideration. Unfortunately, some of these could heighten the risks of war during crises for the same reasons that Soviet missiles do.

Offensive solutions like suppressive fire create strong heat-trigger incentives for preemptive attack, while defensive hedges such as dispersal succeed only if political leaders believe warning signals and react decisively; but history suggests leaders are reluctant to react for fear of provoking attack.

NATO's fear of provoking Soviet preemption could inhibit such precautionary measures out of a hope that such caution might reassure possibly desperate Soviet decisionmakers. But it is equally plausible that a failure to disperse could foster strong incentives for Soviet decisionmakers to substitute military for diplomatic action before NATO's inviting vulnerabilities vanish.

Several inexpensive passive countermeasures—for example hardening, deception—ought to be evaluated in combination with various forms of tactical ballistic missile defenses. By comparison with suppressive fire countermeasures, ATBM defenses of the nonnuclear variety are more consistent with the historic premise that NATO is a purely defensive military alliance.

Because missile defenses are able to cope with the tension between military response and provocation, they could stabilize otherwise explosive crisis environments. Most important, even if NATO leaders fail to react to warning and the Warsaw Pact successfully surprised the alliance, tactical missile defenses could best contend with the consequences of surprise.

In the final analysis, while NATO's threat of escalation may represent the least satisfactory expedient for coping with the coercive potential of growing Warsaw Pact military force, that threat of escalation probably will succeed in deterring the outbreak of major hostilities.

But as Klaus Knorr has wisely cautioned regarding the possibility of a superpower war,

> It is the presence of competitive priorities and incompatible bureaucratic behavior that, in a crisis, makes accidents more possible and favor mistaken decisions and irrational conduct.

For that reason alone, prudence mandates preparing appropriate defensive hedges against the uncertainties of crisis and the possible failure of deterrence. The issue of sufficiency invariably is contentious, as it ought to be. But what ought to be far less fractious an issue is the direction of the Soviet force development process and its consequences if left unattended.

There is a bitter irony in the Soviet coupling of accurate conventional missiles to a truly offensive force strategy. While the threshold between conventional and nuclear war may seemingly be raised, the vital threshold between peace and war may correspondingly be lowered. Under these circumstances, the alliance can ill afford to be reticent in dealing with its most inviting vulnerabilities.

Thank you.

Senator QUAYLE. Thank you very much, Mr. Gormley.

The next witness, Mr. James Woolsey.

STATEMENT OF R. JAMES WOOLSEY, SHEA & GARDNER

Mr. WOOLSEY. Thank you, Mr. Chairman. I do not have a prepared statement. I thought I might make four short points, really in the nature of a footnote to Mr. Gormley's excellent presentation, if I might.

The first is that what we are seeing here, I think, with the evolution in capability of Soviet tactical ballistic missiles, is an evolution that has great strategic importance. It is principally the result of the accuracy of those weapons, and what it means is that those systems are no longer useful, principally—certainly not exclusively—as part of Soviet nuclear forces.

It is an evolution in capability similar to that which other systems have undergone over the years as their roles and missions have changed. The aircraft was originally thought to be principally useful as a scout, the submarine as an escort for surface ships, and those systems went on to develop significantly greater capabilities than was initially thought.

The same, I think, is true of the tactical ballistic missile, which for many years has been set in people's minds as a system that had only nuclear utility. I believe that is no longer true. It is no longer true because of the accuracy of the systems, because of their possibility of being used with chemical warheads and because of the possibility of their being used with modern runway penetrating munitions and the like to strike at NATO infrastructure or the infrastructure of our other allies in other parts of the world.

The second point I want to make is that we, in this country, have been particularly captivated over the course of the last several years by using high technology on systems of this sort to do a very difficult job—essentially second-echelon attack against Soviet armor—and that requires extraordinarily sophisticated and capable sensors to distinguish trucks from tanks and the like.

There are people in this country who are optimistic about it, and there are people who are pessimistic about it. But nonetheless it is a very difficult job. That tends to make us forget the very great vulnerabilities which any large military force and particularly our own forces in Europe have when they might be effectively attacked at their central stationary nodes—command, control, and communications facilities, air bases, nuclear storage sites and the like—as Mr. Gormley mentioned.

That vulnerability of the 25, 50, 100 principal targets in NATO to conventional nonnuclear Soviet ballistic attack is extraordinarily severe when it is coupled with other potential Soviet tactics; the use of operational maneuver groups, as Mr. Gormley mentioned, the use of Spetznaz's or special operations forces and so forth.

One can thus foresee a severe problem that could be posed by the Soviets to NATO—the threat of a problem that would be serious in a crisis, the reality of a military problem that would be serious if war broke out.

This is a rather different problem than the one which most of us have had in mind to this point. We have tended to think either in terms of an all-out nuclear war or in terms of Soviet armor rolling across the central front through the Fulda gap along the lines of what happened in 1939 and 1940 coming out of Germany, but this is something different. This is a vulnerability of these key structures in NATO to a nonnuclear tactical ballistic missile attack operating, really, within a matter of minutes.

The third point I want to emphasize is that the Soviets well understand the vulnerability of their own alliances and their own military structure to a long war. They came to power in 1917 in the midst of a long war that went very badly for Russia. They well understand that the loyalties of the Poles and other Eastern European allies may well be highly uncertain. There is, I think, in their doctrine a strong interest in winning quickly if one must fight.

Now, none of what I have said, I hope, can be interpreted to mean that I foresee immediately or the day after tomorrow some Soviet conventional tactical ballistic missile bolt out of the blue. But those three factors—the evolution of accuracy and the types of warheads on tactical ballistic missiles, our own serious vulnerabilities in NATO, particularly at our fixed installations, and the Soviet appetite for fighting, if fight they must, in a fast conventional war rather than a slow one do, I think, present a serious problem with which we need to deal.

There is a fourth matter that I want to mention which has to do with the international political nature of this problem, and I suppose a lesser included case of that is the domestic political issue as well. Our European allies' principal fear is of decoupling—that the U.S. nuclear deterrent will be made irrelevant or could be made irrelevant through politics, through strategy, or otherwise, to effectively deterring Soviet attack in Europe, conventional attack included.

The SDI debate, as it has progressed so far in the United States, has left some in Europe with the impression that the only topic of interest in this country is with respect to space-based systems and particularly those that might be focused on boost phase intercept.

Some Europeans, including some that are strongly supportive of NATO and of North Atlantic ties in general, hold these concerns quite strongly. The interesting thing to me about antitactical ballistic missile programs—as part of the SDI Program, separate from the SDI Program, as some hybrid within the SDI Program, I do not really care—the interesting thing to me about them is that they answer a real and immediate need for NATO. They hold forth at least the possibility that a number of people of good will across the Atlantic as well as in this country—who may have some disagreements about whether they are optimistic, pessimistic, or genuinely uncertain about the long-range future of the more ambitious aspects of our strategic defense initiative—might be able to join in a common cause with respect to providing a near term, needed tactical ballistic missile defense.

Thank you, Mr. Chairman.

Senator QUAYLE. Thank you very much, Mr. Woolsey.

I think that, Mr. Woolsey, your fourth point is an excellent point and one of the things that has attracted me to this option. Not only is there a vulnerability and a military need for some ballistic missile defense and its being deployed in Europe and perhaps elsewhere, but also a misconception around Europe that SDI is only for the United States, and that we are going to take care of ourselves and forget about Europe.

Although the ABM Treaty complicates SDI, the ABM Treaty does not, as I read it, prohibit any kind of deployment of a ballistic missile defense system in Europe.

We could learn a lot by deploying defenses in Europe, and so I think that it is worth reiterating the possibility, as we go to fill this military requirement, that the ATBM employed in Europe will be more than sort of an SDI-type thing and to see if it works. There also would be a lot of technology and things that we could gain.

The critics of ATBM will argue a number of things, but one of their arguments that they put forward is that they say, Well we don't really need an ATBM. What we will do is to use our deep-strike counteroffensive weapons to eliminate the Soviet tactical ballistic missile threat simply by counterstriking against the missile launchers once an attack is underway. In other words, once the first missile is shot, we will go in and get those launchers and then put them out.

BALLISTIC MISSILE THREAT

I have heard that argument developed, and I just would be curious to have each one of your responses to that as an option against the ballistic missile threat.

Mr. Woolsey, do you want to go first, and then Mr. Gormley?

Mr. WOOLSEY. Let me address both of your points, Mr. Chairman. I think they are excellent ones.

Of course, in order to deal with the Soviet tactical ballistic missile threat on the ground, we have to go first. A friend of mine, Gen. Glen Kent, often says somewhat tongue-in-cheek that people talk too much about the three phases of SDI: terminal, midcourse, and boost phase. There is a fourth phase, which is preboost phase intercept.

What we are talking about here is preboost phase intercept of Soviet tactical ballistic missiles, which is another way of saying going first.

Now, an attack of that sort by NATO or the United States could and would, I assume, only be undertaken in circumstances in which we were absolutely certain that the Soviets either are going to attack or have already attacked in some other way. I suppose it might be considered by a NATO commander if the Soviet Union had already launched a blitzkrieg and for some reason was sitting there stupidly with their SS–23's on the launchers.

But if they attacked more intelligently by attacking first with their tactical ballistic missiles or attacked at the same time, that option would not be available to us—unless we were willing to launch a massive conventional, presumably, preemptive attack into Eastern Europe, and that option is one that I would not think would be commonly part of our planning, to put it mildly.

On the first point you mentioned about the ABM Treaty and deployment, it is worth noting that the ABM Treaty has certain prohibitions against the deployment at least of strategic ballistic missiles—or, I am sorry, missiles to defend against strategic ballistic offensive missiles.

The reason the treaty was phrased in the way it was was in part that the United States, back in the early 1970's, was trying to keep open the option itself for a tactical ballistic missile defense capability for Patriot. We did not take advantage of what was, essentially, that exception in the treaty. The Soviets did, and the Soviets are rather vigorously giving antitactical ballistic missile capability to some of their air defense missiles.

I think the line here is not a bright and clear one. One is talking about a spectrum of ranges and a spectrum of reentry angles and a spectrum of altitudes to which an attacking ballistic missile goes, and the line between tactical and strategic is not a simple and clear one.

Certainly, I would say that at the lower end of the ballistic missile range, set of ranges, any system to defend against them would have to be considered as part of an antitactical ballistic missile defense and therefore permitted under the ABM Treaty.

Senator **Quayle**. Mr. Gormley.

Mr. **Gormley**. Let me just add a few comments to Jim Woolsey's remarks.

There are really two issues, technical and political. On the technical side, just as there is skepticism associated with locating and attacking Soviet second-echelon divisions because of their inherent target location uncertainty, the same would apply equally to the target location uncertainty of Soviet tactical ballistic missiles.

Their vulnerability to counterstrikes increases but only after they are used, because they create a firing signature and then you have at least some prospects of locating them. But the notion of locating them is akin to the notion of locating very effectively mobile targets in the second echelon; a very complex, difficult task indeed.

Second is the political implications in Europe, especially for crisis stability. To underscore what Jim Woolsey said, the Soviet planner would only use tactical ballistic missiles prior to the massive conventional air operation, so the very first step, should a war ever occur in Europe in the future, would be the use of tactical ballistic missiles.

One can be reasonably certain that warning signals will be ambiguous in a crisis. We would have to have extraordinarily strong confidence that the Soviets intended to attack, and given history's record of ambiguity preceeding surprise attacks, I find a future crisis in which we would have certainty that the Soviets were preparing an attack to be somewhat dubious.

Europeans, beyond that, were very skeptical of the counterair-90 program which, among other things, proposed employing massive attacks using conventional ballistic missiles on Soviet airfields. I think they would be equally skeptical with respect to the use of massive numbers of conventional ballistic missiles against Soviet ballistic missiles, primarily because of the strong incentives that would be created to preempt in a crisis.

Senator QUAYLE. Thank you. Senator Warner.

Senator WARNER. Thank you, Mr. Chairman. Again, I commend you for initiating these hearings.

Just one question to both witnesses. As you know, I have worked for some years in the area of the nuclear risk reduction centers and the concept of an accidental event, participating in a nuclear confrontation. Now, a strike out of the blue with this type of weapon would not be an accident.

It would be premeditated to act, but by the time that the various reporting chains disseminated the initial reports of this attack, I wonder if you feel that there is some added risk, now, of an accident or an accidental interpretation—let me rephrase it—some increased risk of the recipients of the various reports of the initial strike misinterpreting this as possibly the use of a nuclear weapon? That is primarily because of the ballistic nature of the attack?

Certainly the explosion would not, I think, be misconstrued initially by those who were reporting it as being nuclear, but hopefully they would not make that mistake, but the fact that it is a ballistic attack far removed from any presence of enemy.

Mr. WOOLSEY. Mr. Chairman, do you mean if NATO used tactical ballistic missiles first against Soviet tactical ballistic missiles, that attack of ours might be interpreted as a nuclear attack?

Senator WARNER. Or vice versa.

Mr. WOOLSEY. Either way, once tactical ballistic missiles start flying through the air, people are going to get extremely excited, I think.

Senator WARNER. It just raises the level of accidental reporting and accidental interpretation.

Mr. WOOLSEY. Absolutely. I think it is one reason why one would like to have in a crisis the ability to intercept Soviet tactical ballistic missile attack and take some time to understand what had happened and so on.

When you have dual-capable systems of this sort, like an SS–23, you certainly are not going to know at all while it is still in flight, whether it is a nuclear or a chemical or runway penetrating munition, and one would have to, on the receiving side, assume the worst, I think.

Senator GOLDWATER. Our overhead systems would pick up through infrared light the launching of these, I presume. At that point, as you say, Mr. Woolsey, you cannot determine what the warhead might consist of.

Mr. GORMLEY. But, Senator, unlike a strategic ballistic missile attack in which you would have roughly 30 minutes warning, here you would have roughly on the order of just a few minutes.

Senator EXON. How many minutes?

Mr. **Gormley**. In the case of the very short range systems, the SS-21, perhaps 2 minutes. For the longer range, the SS-23, SS-22, on the order of under 10 minutes; 6 to 8 minutes.

Mr. **Woolsey**. The SS-21 I think is roughly the range of the Big Bertha artillery of World War I.

Senator **Cohen**. What is the flight time of the SS-20?

Mr. **Gormley**. That would be on the order of 8 to 10 minutes from the western U.S.S.R.

Senator **Warner**. Well, we intend to sit here and plan very carefully during peacetime scenarios about the various weapons, but I can tell you that from my own very limited experience from reading and studing a lot about combat situations that once combat starts there is utter confusion.

I thank the Chair.

Senator **Quayle**. Senator Wilson.

Senator **Wilson**. Mr. Chairman, I would like to congratulate you again. I think this has been a very useful hearing, and I particularly congratulate our two witnesses.

I think Mr. Gormley's presentation is an excellent one, and I think the footnotes, as Mr. Woolsey has modestly denominated his contribution—and I do give it a proper perspective—it would appear that there is an area of rare agreement.

It seems to me that the next step is really to determine perhaps in closed hearing what is being done, and I would commend the Chair for setting that hearing in motion.

SOVIET COUNTERCAPABILITY

I guess the only question I have is what allocation of resources, and you may not be able to answer that in open hearing, but what kind of effort does it appear that the Soviets are making to develop themselves this kind of a countercapability?

We know what they have done by way of developing the missiles. What efforts do they seem to be making to develop the countercapabilities?

Mr. **Woolsey**. The only thing I know of in the public literature on this, Senator Wilson, is statements that show the more modern Soviet surface-to-air missiles, the 10 and the 12, have been given—there is some evidence to indicate they have been given—an anti-tactical ballistic missile capability.

I have seen, and I know the committee will be able to get access to, the direct intelligence information about the SA-10 and the SA-12 and how that evidence has been collected and in what detail it is available.

But I think it is a matter of note, and we, I must say, pointed this out in the Scowcroft Commission Report in 1983.

Senator **Cohen**. What report was that? [Laughter.]

Mr. **Woolsey**. One named for a retired Air Force general named Scowcroft, Senator Cohen—that Soviet surface-to-air missiles had been given some capability against ballistic missiles in flight, at least at the shorter ranges.

I think their level of resource allocation, since those are both significant programs, is significant but I would not put a dollar value on it.

ALLIED JOINT DEVELOPMENT OF ATBM

Senator WILSON. Is there any reason in your minds for not proceeding with joint development on our part; joint development with our NATO allies of ATBM?

Mr. WOOLSEY. I do not see any reason not to at all. I think it is an excellent area of cooperation, potential cooperation, between the United States and Europe. It is in both our interests to protect the NATO infrastructure. The technologies involved here, some of them have some overlap with some of the more ambitious SDI technologies, but others might have less overlap.

There are two that I would mention. One is the type of hit to kill interceptors, which have been developed as part of our own ASAT Program, I think have some potential utility.

The other is for carrying sensors and the like. Dr. James Fletcher who, as you know, headed the SDI study originally for the Secretary of Defense back in 1983, has subsequently done some work on these—long endurance, high altitude aircraft as systems to serve a number of military purposes.

I think one might want to investigate the potential of using those types of platforms for either sensor or weapon carriers. The interesting thing in my mind, in part, about an antitactical ballistic missile capability, whether it was mobile and ground based or aircraft based, is that it might be moved to a trouble spot.

One reason why national leaders, Presidents and Secretaries of Defense and others, like systems such as AWACS and aircraft carriers is that they can send them to trouble spots when something develops. And one might find with some types of antitactical ballistic missile capability that they would have similar flexibility and similar advantages.

Senator WILSON. Mr. Chairman, my time is up. I have to leave, and so I will not be able to participate in the second round. I wonder if I might be afforded the liberty of asking a final question for the record?

I take it, by the way, that in light of that response you do not support the efforts that have been made by some in Congress to curtail joint development efforts and specifically to put prohibitions on the use of expenditures by the United States in conjunction with NATO for the development of such a weapon or such a defense?

Mr. WOOLSEY. I have not made a careful study of those efforts, Senator, but within the context of this antitactical ballistic missile capability I think joint development would be an excellent way to go.

Senator WILSON. Thank you.

DEFENSE OF ISRAEL

Mr. Chairman, my final question would be to ask the witnesses, after the excellent presentations that have been made with regard to NATO, if they do not feel that virtually the same analysis applies with perhaps greater force with regard to the defense of Israel?

Mr. GORMLEY. I have not thought through that problem with the same degree of attention as I have devoted to the central region, so

I really cannot comment on Israel. I might use the opportunity, however, to say that an equal amount of effort ought to be given to the risks along the northern and southern flanks of NATO where the plausible possibility of conflict may be greater than indeed may be the case in the central region.

Senator **Wilson**. Mr. Chairman, I will leave with the parting observation that I think that Mr. Gormley has understated it, and I think history has already demonstrated rather clearly that with the use of a much less accurate and much less capable weapon there has been little reluctance on the part of Israel's enemies to employ such a weapon. That is, of course, what occasioned the Israeli incursion into Lebanon.

Thank you.

Senator **Quayle**. Thank you, Senator Wilson. I think it is a good idea, and I talked with Senator Warner, about getting the SDIO and the OSD and probably the Army up here to find out precisely what they are doing on this program.

According to the earliest arrival rule, Senator Cohen.

Senator **Cohen**. I thank both of you gentlemen for appearing, and I was speaking in jest, of course, when I spoke of General Scowcroft. He is very higly regarded, at least in Moscow, because they apparently have read his report and they liked it and are implementing it, in fact. So, he doesn't have a memorial in Red Square yet, but we do have the SS–24's and SS–25's rolling out which says something about his credibility at least with those planners in Moscow.

Mr. **Woolsey**. That was not our intention when we wrote the report, Senator. [Laughter.]

Senator **Cohen**. Well, there is a little bust of Jim Woolsey being erected out there as well, but apparently they have decided that mobility does lead to more survivability and hopefully stability, and we apparently have rejected that concept in the last year or so.

I would like to ask you, Mr. Gormley, while the debate—I think the question that Senator Warner asked is really quite pertinent. During a time of crisis and there are missiles flying in the air, do we sit back and say, well, it is probably an SS–23 because it had a 10-minute flight time as opposed to a SS–20, which has 15, and that 5-minute delta really spells the difference between nuclear and conventional war.

I doubt very much whether that kind of distinction is going to be drawn during a launch of those missiles, but I think unless we go to the socalled pre-boost phase intercept advocated or suggested by Mr. Woolsey, that were there a launch on warning, that it becomes rather irrelevant as to whether it is an SS–20 or SS–23 or SS–21, does it not?

If what you say is true and depending upon how they target our nuclear sites or conventional sites with the king of numbers that they do have at their disposal, once they are launched and, in fact, land, it does not really matter whether it is nuclear or non-nuclear as a practical matter, does it?

Mr. **Gormley**. I agree with that, Senator. There is so little time and, as Senator Warner pointed out, given the confusion that would ensue from that attack whether it would involve nuclear or conventional, I suspect that the reaction after a highly successful attack would have to involve some hard choices on the use of forces external to the central region and place the burden of escalation squarely on the West.

Senator COHEN. I notice on pages 10 and 11 of your statement, where you go through and discuss the possible countermeasures, suppressive fire against Soviet missile launchers, it is unlikely, would you not say, highly unlikely that we would engage in suppressive fire?

Mr. GORMLEY. Yes, indeed. In fact, in my—the remark was meant to suggest that suppressive fire has some instability problems that are fundamentally no different than instability problems associated with the threat that I discussed this morning; that is, depending on suppressive fire alone creates strong incentives on both sides to strike first out of fear that the other side might execute that very precise conventional attack. The fear is that most of your assets, which represent the heart of your conventional strategy, would be lost and would place the burden of escalation on you.

Senator COHEN. The same is true as far as dispersal of forces. It is highly unlikely that the Europeans would be inclined, upon even seeing signals of perhaps a mobilization on the part of the Soviets, that we would start dispersing those forces. That is highly unlikely.

Mr. GORMLEY. Yes, indeed, because I would suggest that there will always be difficulty in discerning whether the 1914 model or the 1940 model would apply; that is, are Soviet decisionmakers desperate because of unrest in Eastern Europe and are they looking for a cautious response, or do they have premeditated intentions?

So, there is a reluctance to execute dispersal and mobilization out of fear that you might engender an attack.

Senator COHEN. So, given those two options which are highly unlikely, then it seems to me it would lead inevitably to the conclusion or suggestion of Mr. Woolsey that perhaps what we have to do is persuade the Europeans that SDI is not, in essence, a threat to the coupling of NATO and the United States, but rather see if that technology cannot be employed to serve as a real deterrent against such a launch and a real defense against such a preemptive attack on their part.

That would, in fact, be perhaps the only available solution at this point in time. I have been listening to a lot of briefings. Senator Levin, Senator Quayle, and I have been listening to the briefing on the match up of the Soviet conventional forces versus the United States and the NATO alliance, and you have to raise the question that both President Reagan and Mr. Gorbachev apparently are committed to abolishing nuclear weapons from the face of the Earth.

Then the next question you ask is, What happens to Europe in the process if that were to occur? It seems to me that the suggestion you have made is not only an excellent one but perhaps the only option available in the short term to deter this type of a threat.

Mr. WOOLSEY. Senator Cohen, I might just interject. I think there is significantly increasing interest in Europe on this point.

I might just note personally, a couple of years ago Defense Minister Wöerner of the Federal Republic was giving a speech at the Georgetown Center for Strategic International Studies, and I asked him a question about this. He said, well, it is too early to make decisions or recommendations about something like antitactical ballistic missile defense.

They were at a conference in Berlin last summer that I attended and he spoke there. In a conversation on the same question, there was considerably more interest, knowledge and expectation on his part. A number of the leaders of Western European think tanks from Germany, Italy, France, and Britain were at the same conference, and I would say that the interest in antitactical ballistic missile defense there was not one of wholehearted and enthusiastic support, but it was considerably greater than for other aspects of the SDI program.

Senator **Cohen**. Thank you, Mr. Chairman.

Senator **Warner**. Senator Levin.

Senator **Levin**. Thank you, Mr. Chairman. I want to commend you for holding these hearings and for the witnesses being here.

SA-12 AIR DEFENSE MISSILE

I am interested in some of the arms control impacts of ATBM. As I understand it, the administration has some concerns about the SA-12 air defense missile, as to whether it has antiballistic missile capabilities or could have if linked with certain radars.

Is that accurate, that the administration does have those?

Mr. **Woolsey**. That is my understanding, Senator Levin. I do not know against exactly what range ballistic missiles the SA-12 may have been tested, but that is the sort of thing that you would be able to get details on in a classified hearing.

Senator **Levin**. If the range were long enough, at that point it has some ABM Treaty implications?

Mr. **Woolsey**. At some point, this becomes a question of how many stones make a heap. The range—if one assumes a flat Earth (for purposes of the shorter range systems, that is not too far off, I suppose)—I think the apogee of the system in a normal ballistic trajectory is something like a quarter of the range. So a 500 kilometer system is going to have an apogee of maybe 125 kilometers, which is well up into space.

Senator **Levin**. At what range does it have ABM Treaty implications?

Mr. **Woolsey**. Well, I think you can get into reasonable arguments about that among reasonable people. SS-20's begin to have the range and altitude characteristics similar to short range submarine-launched ballistic missiles, so there is really a spectrum from ICBM's to SLBM's, and SS-20's are in there somewhere down lower.

As one walks up that set of capabilities in terms of what your antitactical ballistic missile can effectively engage, you get closer and closer to something that could reasonably be called a system to counter at least submarine-launched ballistic missiles in flight.

Now, whether it would be possible to have a system that distinguished—let's say in effect—what was effective against SS-20's but not against SLBM's, I am not certain. I think you need technical witnesses to explore that. But to have a system that would be effective against SS-23's and possibly SS-22's but not against considerably longer ranged missiles, that seems to me might be somewhat easier.

So, it really is a matter of a range of technical judgment about a set of capabilities of radars and sensors, the speed of interceptors and the like, and there is no way, really, to answer it cold without getting into the details. And you do not want the answer from a lawyer/history major like me, I must say. [Laughter.]

Senator LEVIN. At the fringe, then, there might be some implications relative to the ABM Treaty?

Mr. WOOLSEY. It depends upon how you do it.

Senator LEVIN. Could there be implications at some point down the continuum?

Mr. WOOLSEY. There could be with different types of technology. I have heard knowledgeable people say, for example, that if one had an airborne optical sensor on an aircraft, that if one made it small one might have what is called sometimes in the arms control business a functionally related observable difference, or FROD—like the racks on bombers to carry cruise missiles—something that would essentially distinguish it functionally from other systems.

If one is talking about a ground-based antitactical ballistic missile system with a certain type of radar and a certain type of, let's say, hit-to-kill interceptor, that might be somewhat less ambiguous.

There is no way to get into this without going system by system and subsystem by subsystem.

Senator LEVIN. Would you say that if both sides had ATBM's which were judged to have at least limited capability against strategic missiles, that that could affect the credibility of the ABM Treaty?

Mr. WOOLSEY. Well, it is a possibility, depending upon what types they were. I would say, just hypothetically, if neither side had a system that had any capability against ICBM's and some very limited capability against submarine-launched ballistic missiles, that might be something that the executive branch and the Congress would be willing to agree was effectively an antitactical ballistic missile system.

Something that had very good capability against submarine-launched ballistic missiles and some against ICBM's as well would be a much more capable ballistic missile defense system, and one might not want to say at all that that was compliant with the ABM Treaty.

It is a complex set of judgments.

Senator LEVIN. My last question, because I think I am out of time, and probably we are, too, because we have to vote, but assuming both sides had ATBM's with limited capability against strategic ballistic missiles, assume for a moment that both sides are perceived to have that, and you say there are some possible impacts on the ABM Treaty's credibility.

If that is true, is it not also true that that could have some impact on the negotiations at Geneva; that if we are asking for deep cuts in strategic missiles, that if both sides have limited capability in the ATBM against strategic missiles that it could affect those negotiations or be a factor in those negotiations. And as a result we may want to in some way limit it or control it, regulate it or somehow or another make decisions relative to it?

Mr. **Woolsey**. Senator Levin, I think that this issue is the sort of issue that one needs to talk about in the arms control negotiations with the Soviets.

I must say that if they have already given an air defense missile the capability against a ballistic missile of a certain range, then any U.S. capability up to and including that sort of antitactical ballistic missile capability would seem to me to be a reasonable thing for us to do.

Senator **Levin**. How about beyond that?

Mr. **Woolsey**. Beyond that, one begins to get into the business of talking with the Soviets about defensive systems and how and whether one is going to permit them under a new or evolving regime with different types of limitations than we have now.

That is the sort of thing that one might certainly want to talk with them very carefully about. This sort of defensive system has not been the center of, say, the focus of their attention. In their public statements they have tended to focus on space-related issues.

Senator **Levin**. Thank you.

Senator **Quayle**. Is it not true that the Soviets have the capability, particularly defenses against ballistic missiles, that they have tested against the ballistic missile defense, the SA-10 and the SA-12?

Mr. **Woolsey**. That is my understanding, Senator Quayle.

Senator **Quayle**. They have this capability right now?

Mr. **Woolsey**. Against some. It is my understanding that there has been some testing of the SA-10 and the SA-12 against tactical ballistic missiles of a certain range.

Senator **Quayle**. I do not believe that we have raised this as a violation of the ABM Treaty.

Senator **Levin**. Now, I am not suggesting that you have. What I wanted to know, and Mr. Woolsey has answered, is that if we went beyond what their capabilities are as they are testing them, that at that point surely it would be a subject of negotiation or should be or might be, and we may want to include it as the subject of negotiation at Geneva.

I could not agree with it more, because I think there are other implications.

Senator **Quayle**. Gentlemen, thank you very much for your very fine testimony. Pursuant to the conversation I had with Senator Warner, we will instruct the staff to get SDIO and the Army over here to tell us what they are doing.

Thank you both very much.

[A prepared factsheet submitted by Senator Dan Quayle follows:]

FACT SHEET

(January 30, 1986)

THE SOVIET CONVENTIONAL TACTICAL BALLISTIC MISSILE THREAT AND THE NEED FOR AN ANTI-TACTICAL BALLISTIC MISSILE [ATBM] DEFENSE

OVERVIEW

A new threat to the North Atlantic Treaty Organizaton (NATO) is emerging. That threat is the Soviets' deployment of short-range ballistic missiles accurate enough to destroy most of NATO's key military assets with conventional or chemical warheads and the Soviets' increasing ability to defend against NATO's deep strike counter-attack weaponry.

Against this threat, plans to rely exclusively on high-technology deep-strike counter-offensive weapons will not suffice. In addition, NATO will have to develop and execute a passive defense master plan and develop and deploy anti-tactical ballistic missile systems. If NATO does not, the Soviet incentive to strike NATO first will only increase and virtually all of NATO's key military assets (nuclear and non-nuclear) could be destroyed in a Soviet attack lasting only hours and involving few or no nuclear weapons.

THE NEW SOVIET STRATEGY AGAINST NATO: SWIFT AND DISCRIMINATE

In the 1950s and 1960s Soviet theater military doctrine emphasized the need and desirability of either launching a major nuclear attack against the full depth of the NATO theater or of escalating quickly from a conventional war to such an all-out nuclear attack. Within the last ten years, however, both Soviet theater military doctrine and technology have shifted toward emphasizing the desirability of keeping any theater conflict conventional, particularly at the battle front, and of preventing NATO from employing nuclear weapons.

Toward this end, the Soviets instituted several major changes:

They reorganized the Warsaw Pact air force so that deep-long-range conventional strikes could be made against NATO targets instead of an initial mass nuclear strike against these targets.

They revived the concept of operational maneuver groups (OMG's) so that they might penetrate NATO lines quickly and cause chaos and collapse before NATO dispersal of nuclear arms.

They pre-positioned enough military supplies at the fronts to deprive NATO of the earning of an offensive normally afforded by monitoring the movement of supplies from the Warsaw Pact's rear.

They focused on refining their conventional, short-range ballistic missiles so that these missiles could be accurate and lethal enough to destroy or disrupt most of NATO's key air defense assets, tactical air, counter-offensive missiles and nuclear storage sites at the very outset of war. These missiles would allow the OMG's and Warsaw Pact air forces the opportunity to complete their missions without having to face prohibitively high counter-offensive and defensive resistance.

THE NEW SOVIET MISSILES

The key missiles of interest to the Soviets in promoting their new theater strategy—the SS-21, SS-22, and SS-23—are significant up-grades of older short-range missiles, specifically, the Frog, Scud and Scaleboard. These new missiles have improved range, they are much more accurate—they have smaller circle of error probables (CEPs) measured in meters—and they have Improved Conventional Munition (ICM) payloads. The tabulation below summarizes the unclassified information on these new missiles' attributes as compared with their predecessors.

	SS-21	Frog-7	SS-22	Scaleboard	SS-23	Scud
Range	120 km	70 km	900 km	900 km	500 km	300 km.
CEP	50 m. expected	800 m	50 m. expected	463 to 927 m	50 m. expected	570 to 900 m.
Year of initial deployment.	1976	1968	1979	1967	1968	1961.
Number of launchers deployed in Europe.	76	240	1-for-1 replacement for Scaleboard before 1990.	120	1-for-1 replacement for Scud before 1990.	300.
Warhead	ICM chemical nuclear.	Nuclear chemical conventional (unitary).	ICM nuclear	Nuclear	ICM nuclear	Nuclear chemical conventional (unitary).

All of the launchers above are mobile and can be repositioned after use for refiring within a very short period of time (in minutes, not hours). This makes NATO's ability to find and hit these launchers after they have been fired against NATO targets most difficult.

Also, these new missiles are all almost certain to carry ICMs. Although the unclassified literature is not detailed on this topic, Warsaw Pact military publications have emphasized the importance of attacking with missiles employing cluster munitions. The submunition types mentioned include fragmentation, armor-piercing, shaped charge, smoke incendiary and minelets.

There is no evidence yet of actual Soviet deployment of kinetic-energy or shaped-charge penetrators, but the effectiveness of such munitions designs against 10-meter concrete structures and main runways was demonstrated nearly a decade ago in the United States. Thus, detailed Soviet discussion of such munitions must be taken seriously.

The same point must be kept in mind concerning Soviet enthusiasm for fuel air explosives (FAEs). FAEs disperse an explosive fuel aerosol near the targety and then detonate the aerosol with a burster charge. Because FAEs spread their energy uniformly over a large area, they produce an explosive effect comparable to a small nuclear explosive. In fact, the Soviets are reported to have used FAEs dropped from airplanes against targets in Afghanistan. They are reported to have been capable of creating craters 30 feet in diameter and 18 feet deep—more than enough to destroy NATO electronic equipment shelters and other command centers.

Finally, the Soviets could choose to use chemical munitions to arm their new tactical missiles, as they already have with the SS-21. This would combine the advantages of aircraft delivery (accuracy and long-range) with those of missile delivery (nearly instantaneous delivery with certain penetration of NATO defenses). Such advantages clearly would make the use of chemical weapons more attractive.

NATO'S VULNERABILITY TO THE THREAT

The Soviets' target list for their conventional short-range ballistic missiles, as noted in recent Soviet military publications, includes NATO nuclear strike systems, airfields, air defense systems, command and control posts and centers and depots of reserve material and equipment.

The idea behind such targeting is to deny NATO the ability to make good on its threat of nuclear first-use and to so repress NATO air defenses and counter-offensive capabilities (including reserve mobilization and reinforcement) as to make further Soviet offensive actions with frontal air and armored assaults relatively risk free.

As explained in a most revealing and detailed analysis by Dennis Gormley of the Pacific-Sierra Corporation, the Soviets' priorities are to prevent NATO from dispersing its nuclear weapons systems, to cripple NATO command and control communication (C3) centers, to repress NATO's air defense units and counter-air capabilities and to delay deployment of NATO reinforcements.

The maximum number of NATO targets these objectives involve prior to dispersal in the central region is relatively small, as Gormley's unclassified tally makes clear below:

Target categories

	Number
Theater nuclear weapons:	
Storage sites	50
Dual-capable airfields	10
Missile garrisons	20
Air Defenses:	
Major C3 headquarters (for air defense)	15
Sector operations centers	3
Control and reporting centers	9
Intercepter airfields	10
Warning/surveillance	5+
Major C3 headquarters	9
Reinforcement POMCUS depots and debarkation points	25
Approximate total	160

As Gormley notes, it is in the Soviets' interest to keep NATO from dispersing its nuclear assets because this would allow NATO to increase its 80 fixed nuclear installations to over 300 mobile ones. NATO, however, is reluctant to order such dispersal since this itself is considered to be escalatory. All Soviet missile strikes need to do is damage NATO nuclear site handling and off-loading equipment to undercut NATO's first-use threat.

As for NATO's C3 targets, these are fixed, few in number and quite soft (less than 10 pounds-per-square-inch hardness). NATO air defenses are not much better. In fact, currently they cannot defend against ballistic missile attack. Plans are underway to improve the Hawk and Patriot systems so that they can at least defend themselves against SS-21 and SS-23, attacks but completion of these efforts is at least several years away.

There also has been talk of NATO targeting Soviet missile launchers with deep strike ballistic, cruise and stand-off missiles. Their deployment and the deployment of the target acquisition systems they will require are at least several years or more away. More important, these proposed NATO counter-offensive weapons systems might themselves be targeted by the Soviets before they ever left their launchers. And, with the Soviets' deployment of the SA-10 and SA-12 air defense systems, there is no assurance that those NATO missiles that do acquire their targets will be able to survive Soviet defenses.

As for passive defenses, NATO investments have increased. Hangerettes for more aircraft have been built. Fuel and munition depots and C3I facilities have been hardened. Attention has also been paid to the dispersal of aircraft and NATO nuclear weapons systems.

Still, the hardening efforts cannot meet the possible challenge posed by FAEs and kinetic energy and shaped charge rounds. And NATO dispersal plans assume the ability of NATO nations to agree quickly to disperse. The plans are vulnerable to security leaks.

THE THREAT OUTSIDE OF NATO

In Asia, the Soviets have deployed over 100 Scud launchers that will soon be replaced by longer range SS-23's and 40 Scaleboard launchers that will be upgraded with SS-22 missiles. Both of these missiles will be able to cover U.S. C3 facilities, nuclear capable weapons systems and airfields located both in South Korea and Japan. Also, the North Koreans themselves have 54 FROG launchers that could be upgraded with SS-21 missiles sometime in the next decade.

In the Middle East, Arab armies currently possess more than 200 Soviet supplied Scud, Frog and SS-21 launchers supported by an inventory of at least 1,000 missiles. Although most of these missiles are too inaccurate to destroy hardened point targets, the SS-21's with cluster munitions are not. In fact, Syria now has 24 SS-21 missiles that are within range of at least one major Israeli air base, Ramat David. If deployed in Jordan, all of Israel would be vulnerable. It is likely that by the early 1990's, existing Arab Frog missiles will be replaced with SS-23's.

At present, neither Israel nor Japan nor South Korea have any effective passive defenses against this emerging conventional ballistic missile threat. Their only military recourse now is to find the launchers and attack them before they are ever used—i.e., strike first. This is hardly a prescription of stability.

WHAT IS TO BE DONE?

The first order of business should be to attempt to relate allied counter-offensive plans to allied passive-and active-defense plans. What are the trade-offs for investments in hardening our military assets or in making them mobile as compared to buying counter-offensive weapons systems to target Soviet missile launchers or anti-tactical ballistic missiles to shoot them down after they are launched?

One of the objectives of such an analysis should be to determine what the proper mix should be. What are the consequences of having no active defenses, no passive defenses, no counter-offensive forces or of having only two out of three? Which effort deserves more emphasis?

Another objective should be to help determine just how robust our counter-offensive and anti-tactical ballistic missile systems need to be. If NATO made its military assets more difficult to find or kill by improving its passive defenses, might a cheaper, less effective anti-tactical ballistic missile system do where previously only a more capable ATBM would suffice? Similarly, if NATO had passive and active defenses, wouldn't this reduce the need for NATO counter-offensive weapons to be used or dispersed on a hair-trigger basis?

This brings us to the second order of business, which is to ensure that the United States has a sound active/passive defense cooperative architecture effort under way with its allies. Considerable progress has been made in the last few months. The Strategic Defense Initiative Office [SDIO] and the Army have made ATBM architectural work one of their objectives. The British have also begun work on such architecture studies.

The questions that remain are: How will SDIO be able to contract cooperative development if it is unable to secure government-to-government arrangements (arrangements that may not be possible with some of our key allies)? Are we prepared to establish a specific program for ATBM's if the architectures appear promising? And how would ATBM development relate to development of SDI if we continue to adhere to the ABM Treaty and its requirement that ABM technology used in an ATBM system not be tested first against a strategic offensive missile?

Each of these questions needs to be answered. The Soviet tactical missile threat will certainly not decrease, and we have too much invested in protecting our forces and those of our allies to ignore it.

[Questions submitted for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN W. WARNER

DEVELOPING AN ATBM SYSTEM

Senator **WARNER**. Are you aware of the work being done in the Department of Defense to develop an ATBM system, and are these efforts adequate?

What level of effectiveness should we require of an ATBM system for it to play an important role in frustrating Soviet military objectives in Europe? Would it need to be anywhere near 100% effective?

Mr. **GORMLEY**. I am generally aware of work being done in the so-called JATM, or Joint Anti-Missile program, for which the Army is the lead service. I understand the program includes improvements in the Patriot and Hawk air defense systems to allow defense against ballistic and cruise missiles, respectively. I believe that a dual-mode Patriot (meaning that it could alternate between air and ballistic missile threats) would only have capability to defend against conventionally armed SS–21s, SS–23s, and possibly SS–22s, but not against nuclear or chemical tactical missiles, or the longer-range systems like the SS–20.

While the Patriot upgrade would only permit it to defend itself or furnish point defense for critical fixed installations, I understand more comprehensive and effective solutions are being investigated under the SDI program. Two important elements of the SDIO's efforts are an airborne early warning sensor for passing tracking data to ground-based radars and high-acceleration non-nuclear kill interceptors for area-wide terminal defense.

As for the issue of how adequate these programs are, one needs to consider just what level of effectiveness is desired for ATBM defense. Given the President's goal of a perfect defense against nuclear ballistic missiles, the SDIO has focused on achieving highly effective, comprehensive solutions which may not be available for European deployment until the mid 1990s, if not later.

By contrast, Patriot upgrade only promises limited effectiveness against conventional missile threats. Nevertheless, I believe that such a modest capability is essential to deterring conventional war in Europe. It would achieve such an important deterrent effect on Soviet calculations by frustrating the delicate timing involved in the Warsaw Pact coordination of first-wave conventional missile and follow-up air attacks. In other words, even a modest ATBM system could turn Soviet confidence into doubt by denying Warsaw Pact planners a decisive edge in a pre-emptive conventional air operation.

NATO could choose to establish its requirements beyond upgrading the planned Patriot European deployment along the following lines: first, decide on which military complexes require protection in order to achieve NATO's minimum set of military objectives; second, determine the temporal requirements for defending these military complexes. Some small number of facilities (e.g., major C^3 headquarters) might require prolonged defense while others (such as nuclear storage sites and missile garrisons) need be defended only until units have departed fixed facilities for safer havens; and third, deploy only enough launchers and missiles to raise Soviet uncertainty about the success of the conventional air operation. Soviet efforts to overwhelm a small number of defended high-value targets by concentrating an attack might succeed, but only at the expense of sparing other critical targets from the initial missile attack. By so complicating the air operation's planning, such a limited-capability system could shift the burden of escalation to Soviet decision makers, where it belongs.

Patriot's modest capability against conventional missile threats could be improved later on as the SDI program progresses. An airborne early warning sensor, such as the Airborne Optical Adjunct program, might be able to greatly enhance Patriot's effectiveness through provision of early warning tracking data. The addition of a new high-acceleration interceptor would substantially broaden coverage against a range of Soviet nuclear as well as nonnuclear attack options.

The important point is to get these ATBM programs moving. I believe the Army's JATM program lost nearly two-thirds of its fiscal 1985 funding of $92 million to a congressionally-imposed cut. It's important for JATM's 1986 funding to remain secure. It is not clear to me that priority SDIO has assigned to those parts of its program that are most relevant to furnishing defense against tactical ballistic missiles.

STRENGTHENING CONVENTIONAL DEFENSES

Senator WARNER. Can we enhance deterrence by strengthening our conventional defenses in Europe through "emerging technologies" without at the same time developing an ATBM capability?

Mr. GORMLEY. I believe not. In fact, I believe that without ATBM deployment, emerging offensive technologies, when combined with new Western doctrinal initiatives, could foster dangerous instabilities in a future European crisis setting. The United States and its NATO partners have embarked on, or are considering, several doctrinal initiatives which depend importantly on the performance of emerging conventional technologies. For example, two objectives stimulated interest in developing the U.S. Army Airland Battle doctrine. One was the need to reduce the Warsaw Pact's freedom to commit second-echelon forces whenever it best suited their purpose. The other was meant to exploit Warsaw Pact vulnerabilities, thought to consist of unprotected flanks, overcentralized command and control, and limited lines of communication. But attempts to exploit these vulnerabilities through offensive countermaneuvers would occur only if NATO efforts to defend forward and to delay second-echelon forces with emerging technologies prove successful.

Soviet planners recognize the degree to which the success of Airland Battle and SHAPE's Follow-on Forces Attack (FOFA) strategy (just as their own OMG concept) rests on achieving air superiority. Because they do, Soviet military authorities are more concerned about the "intensity of fire" that NATO could eventually bring to bear than any threat to maneuver forces onto Warsaw Pack territory. And because, as Marshal Ogarkov has said, qualitative changes in conventional weapons—longer ranges, greater accuracy, and improved lethality—are drawing these weapons closer in effectiveness to nuclear weapons, the importance of launching preemptive conventional strikes against NATO's emerging conventional capabilities is increasing.

Quite naturally, Soviet military authorities characterize the deep strike component of Airland Battle as a "preventive strike," necessitating preemptive Warsaw Pact action. Given the critical importance of the air campaign to both sides, there will be strong incentives during crises to take action. On the Warsaw Pact side, both improved conventional missiles and new operational concepts for exploiting such fires are being deployed and implemented.

On the whole, if Airland Battle, FOFA, and counterair initiatives are seriously pursued, they will have a strong deterrent effect on any aggressive Warsaw Pact designs. Soviet planners respect these more offensively oriented strategies; in contrast to the seriousness with which Airland Battle has been greeted, Soviet military specialists were virtually mute in their reaction to the U.S. Army's more defensively oriented "active defense" doctrine promulgated in the FM 100-5 of 1976. They are especially impressed with the potential of the West's emerging conventonal technologies to achieve decisive results early in any military campaign.

But what may be the best deterrent against Soviet premeditated aggression may not be the best doctrine for coping with the complexities of crises stability. NATO depends heavily on acquiring positive warning of hostile adversary intentions and on rapidly responding to that warning. Although the Soviet Union has done much to streamline the Warsaw Pact transition-to-war process, it is highly unlikely that transition signatures could be entirely suppressed. At the same time, however, it is not clear that Western political authorities will alert NATO forces for fear of provoking a preemptive Soviet response.

NATO's fascination with offensively oriented doctrines and capabilities has the quality of a double-edged sword: what is a strength and deterrent in peacetime could become a distinct liability in uncertain crises. NATO's improved conventional stamina makes it all the easier for Western political leaders to create plausible explanations for anxious Soviet defensive moves during a crisis. If the Soviets actually harbored premeditated designs under such circumstances, the consequences of NATO's failure to respond are obvious. What is equally dangerous, however, is the prospect of a future crisis in central Europe in which the Soviet Union takes defensive measures built on anxiety, NATO makes no corresponding move to enhance its survivability, and the Soviets decide to attack anyway. Rather than reassuring desperate Soviet decisionmakers, a dilatory NATO response to Warsaw Pact mobilization could just as easily foster strong incentives for Soviet leaders to substitute military for diplomatic action before NATO's inviting vulnerabilities vanish.

NATO's weaknesses in this regard are nothing new; what is new is a set of mutually reinforcing preemptive incentives intrinsic to existing Warsaw Pact and emerging NATO military doctrines. By no means, however, should NATO spurn all such initiatives. Some, like the limited-maneuver features of AirLand Battle, have strong deterrent value. Others, such as dependence on a large force of conventional ballistic missiles for counterair operations, raise disturbing crisis stability questions because they reinforce and create even stronger hair-trigger incentives during crises in much the same fashion as Warsaw Pact conventional missiles do. The danger lies in coupling offensively oriented doctrines and technologies to traditional NATO plans that assume there will always be enough time and the political will to deploy major concentrations into position, to reinforce, and to disperse nuclear weapons and aircraft to relatively safe havens.

It is in this regard that even modest levels of ATBM defense would perform an essential role in Alliance security. That role is to persuade Soviet decisionmakers that the Alliance could survive the initial weight of a preemptive conventional missile and air campaign, even in cases where it has failed to take defensive measures during a crisis and is surprised. Demonstrating the ability to survive the Warsaw Pact's initial blow (thereby preventing NATO's rapid disintegration) represents the Western Alliance's best means of enhancing deterrence and crisis ability, and should deterrence fail, of ultimately triggering Warsaw Pact disintegration.

Senator WARNER. What level of effectiveness should we require of an ATBM system for it to play an important role in frustrating Soviet military objectives in Europe? Would it need to be anywhere near 100% effective?

Mr. WOOLSEY. I do not believe this level of effectiveness would be necessary. Something more analogous to the effectiveness we expect from a good new air defense system would seem more appropriate.

Senator WARNER. In your judgment as a lawyer, does the ABM Treaty prohibit the development and deployment of an ATBM system?

Mr. WOOLSEY. Not unless it is tested against a target vehicle which has the characteristics of a strategic ballistic missile in flight trajectory.

QUESTIONS SUBMITTED BY SENATOR DAN QUAYLE

SHELTER PROTECTION AGAINST SOVIET TACTICAL MISSILE THREAT

Senator QUAYLE. Aren't the shelters being built for our aircraft hard enough to protect them against the projected Soviet tactical missile threat? How hard would they and other fixed installations (e.g., command and control posts) have to be against this threat?

Mr. GORMLEY. Publicly available information on Soviet conventional munitions is simply too imprecise to answer your question definitively. However, U.S. research in the mid-1970's on heavy, shaped charges (consisting of an 800-kilogram warhead with steel liner) showed a penetration capability of ten meters of concrete. Older, hardened structures, such as many air defense command and control bunkers and nuclear weapon storage igloos, would be vulnerable to an accurately placed weapon of this sort. Indeed, even the survivability of newer underground command and control bunkers, which consist of two meters of concrete and steel and roughly four to six meters of earth and rock cover, could be challenged within the coming decade by emerging Soviet conventional systems.

It is also important to point out that aircraft protected in hardened shelters do not necessarily represent the most tempting target for Soviet conventional missile attacks. The goal, from a Soviet targeting perspective, is to interrupt NATO's capacity to generate aircraft sorties. Sortie generation from an airbase requires a supporting infrastructure to prepare, launch, control, recover, rearm, refuel, and maintain aircraft. Missile attacks against the soft, vulnerable airbase infrastructure would severely tax NATO's ability to sustain aircraft sorties.

MOVING MISSILE LAUNCHERS

Senator QUAYLE. How long does it take the Soviets to move their missile launchers after they have fired a tactical missile? Is this period measured in terms of days, hours, or minutes? How realistic is it that we could gain intelligence concerning these launchers' location in time to target them with counter-strike missiles of our own?

Mr. GORMLEY. I don't have a definitive answer to this question, but one must assume mobile missile launchers can move within minutes, not hours or days, after a launch event. The notion of rapidly detecting and coordinating counter-strikes on launchers within a matter of minutes is theoretically possible, but extremely technically demanding under the best of conditions. And the best of conditions are certain not to obtain for the side that strikes second; that is, NATO. The question assumes that NATO can absorb the weight of the initial Warsaw Pact missile strike and conduct some sort of counter-strike. But we need to keep in mind that at least a portion of the initial Warsaw Pact missile salvo will be aimed at NATO's counter-strike capacity. Soviet military writers say they intend to do this. Without some form of active—supplemented by passive—means of defense, offensive counter-strike solutions to the Soviet tactical ballistic missile program promise at best to deliver problematic results and at worst to stimulate crisis instability, because of the strong incentives they create to strike first.

NATO'S COMMAND AND CONTROL CENTERS

Senator QUAYLE. How vulnerable is NATO's command and control centers to Soviet Tactical Ballistic Missile Attack?

Mr. GORMLEY. The vulnerability of NATO C^2 is answered in my response to Senator Quayle's first question on aircraft shelters and command and control sites.

Senator QUAYLE. Can't NATO's deep-strike counter-offensive weapons (planned for the 1990s) eliminate the Soviet tactical ballistic missile threat simply by counter striking against Soviet missile launchers once an attack is under way?

Mr. GORMLEY. This question is answered in my response to Senator Quayle's second question on the feasibility of counter-strike weapons against Soviet launchers.

CHEMICALLY ARMED BALLISTIC MISSILES

Senator QUAYLE. If the Soviets were to attack one of NATO's POMCUS sites deep into NATO territory with a chemically armed ballistic missile, how much chemical decontamination equipment would be required to clean just this one site? Also, would NATO troops throughout the depth of this strike have to don the sort of protective suits that are likely to reduce their military effectiveness by 50%? Would using a tactical missile to deliver chemical weapons be quicker and more certain than using a plane that would have to fly through NATO air defenses?

Mr. GORMLEY. Precise missile-delivered chemical attacks on just a few rear-area targets in NATO would have devastating effects on the Alliance's ability to reinforce. Chemical attacks on POMCUS sites alone would create delays in reinforcement of at least several days and reportedly require most of Europe's chemical decontamination units to clean up the effects. Equally important, the rapid supply of incoming units to Europe would undergo serious disruption because POMCUS sites depend heavily on local civilians who are insufficiently equipped and trained to operate in contaminated environments.

For limited chemical attacks against just a few critical installations such as POMCUS sites, NATO troops would probably not have to don protective clothing. More widespread Warsaw Pack use, however, would compel such protective measures. Because of the unpredictability of weather conditions and the potential deleterious effects on friendly as well as adversary troops, Soviet planners might choose to employ chemicals very selectively, but nonetheless with very devastating results.

Of course, in the absence of any active means of ballistic missile defense for POMCUS facilities, Soviet tactical ballistic missiles are assured of penetrating to their targets, except for faulty missile performance. By contrast, Soviet high-performance aircraft are far more susceptible to attrition, given NATO/s heavy investment in modernized air defenses.

TARGETING NATO NUCLEAR STORAGE DEPOTS

Senator QUAYLE. In your article for the forthcoming book, *Swords and Shields*, you note that the Soviets are most anxious to target NATO nuclear storage depots and the equipment to off-load NATO nuclear weapons from these storage sites to transport vans. Is there nothing we can do now to increase the Soviets' uncertaintly as to where all of our nuclear weapons are deployed? Would it make sense to design our nuclear weapons with insertable components so that the weapons could be moved without their core material, thus, minimizing the terrorist threat of dispersing our nuclear weapons more often?

Mr. Gormley. I'm afraid that the Soviets will always have a relatively easy job of knowing where NATO's nuclear weapons are deployed, simply because the Alliance is comprised of open, democratic societies. However, our nuclear modernization programs do offer improvements which could alleviate problems that inhibit frequent peacetime dispersal exercises. Insertable components, as I understand them, would permit the special nuclear material to be held securely and separately from the bulk of the warhead. In that way, warheads—without their nuclear cores—could be handled in the same manner as conventional warheads. In this less constrained environment, responsible NATO units would certainly become more practiced in executing rapid dispersal operations. This could possibly serve to de-sensitize the dispersal process. But it is not completely clear to me that such an improvement would ever entirely reduce the natural tension between military response and provocation in a delicate crisis. Even though special nuclear materials are dept separate from the remaining warhead components, the process of their dispersal signals the first act in a chain of events that could very well be misperceived as hostile intent, or the "last best chance" to pre-empt.

It is under these circumstances that anti-tactical ballistic missile defenses serve a critical purpose. By protecting critical military installations like NATO's nuclear storage sites, ATBM defenses could stabilize explosive crisis environments by giving NATO decisionmakers a choice to hold off nuclear dispersal while diplomatic machinery are engaged in crisis management. And even if the Warsaw Pact successfully surprises NATO, ATBMs of even modest capability increase the changes that NATO nuclear weapons would survive the initial weight of the Warsaw Pact attack. Such prospects for NATO would have enormous deterrent value by protecting the very heart of flexible repsonse: NATO's ability to threaten nuclear escalation.

TACTICAL BALLISTIC MISSILE THREAT

Senator Quayle. Dr. Gormley or Mr. Woolsey—Although this hearing has focused on the tactical ballistic missile threat to NATO, might there not also be a similar threat in the future for our Asian allies and U.S. facilities located there (particularly South Korea and Japan)?

Mr. Gormley. NATO is especially vulnerable to Soviet shorter-range ballistic missiles because the Alliance has little strategic depth on the European continent. Most of its highest value military facilities are clustered within 500 kilometers of the inner-German border. It is not surprising therefore to find several hundred Warsaw Pact tactical missile launchers confronting this target set. Our Asian allies, South Korea and Japan, are more fortunate to be outside the range capability of these missiles, save for the SS-22, which the Soviets have currently deployed fewest of in the operational-tactical missile category. From the Soviet Far East around Vladivostok, parts of northern Japan and roughly two-thirds of South Korea are within range of the SS-22. But I have not examined the particular vulnerabilities of U.S. and allied military facilities in the region to say with confidence that the emergence of highly accurate SS-22s in the future would be as worrisome as it is for the central region of NATO. Clearly, however, the area bears watching.

Regarding the Middle East, the Soviet introduction of a highly accurate missile into Syria could have important adverse consequences for Israel's security. Again, I have not examined the particular vulnerabilities of this region in any detail, but in view of Israel's great dependence on sustaining aircraft sortie generation, it would appear obvious that Israel ought to be concerned. On the other hand, I suspect that for several reasons, among them, the lack of suitable terrain in Syria to hide missiles, Israel will be in a better position to bring counter-fire to bear against any future missile threats in close proximity to her territory, than would NATO against Warsaw Pact missiles.

ATBM

Senator Quayle. Albert Wohlstetter and Fred Hoffman have argued that ATBMs need only be partially effective in protecting NATO military assets to upset Soviet war planners who hope to use their tactical missiles and existing Warsaw Pact forces to launch a surprise shock attack. Even if ATBMs protected only 50% of NATO's key military assets, they argue, this would deprive the Soviets the confidence that they could attack NATO with little or no mobilization and succeed. Is this thinking sound?

Mr. Woosley. Yes; I believe so.

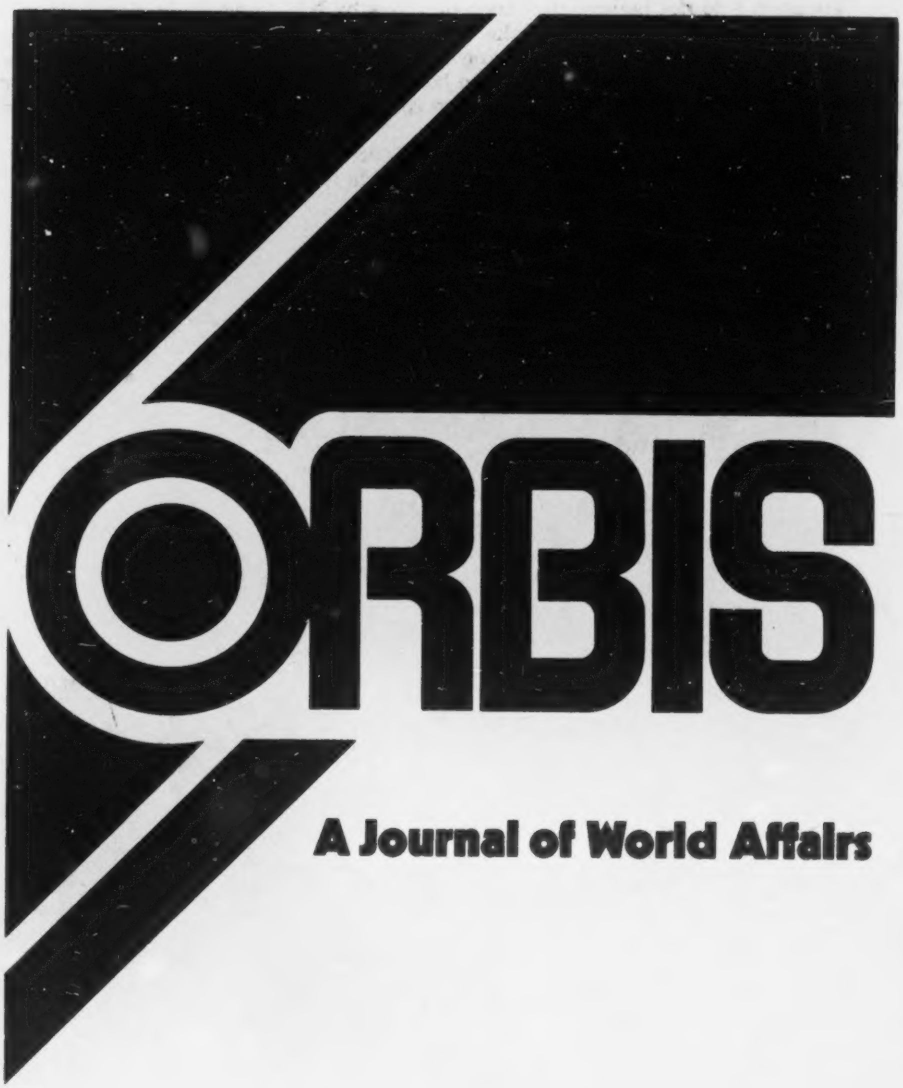
Senator Quayle. Given that the Soviets are deploying ATBMs and more accurate tactical ballistic missiles, would it be destabilizing for NATO to attempt to develop missile defenses of its own against shorter range tactical missiles? Isn't the case that if NATO does not perfect defenses against these missiles that it is more attractive for the Soviets to attack than if NATO does have missile defenses?

Mr. **Woolsey**. I do not believe that such defenses by NATO would be destabilizing. I agree that such defenses would make it less attractive for the Soviets to attack.

Senator **Quayle**. Although this hearing has focused on the tactical ballistic missile threat to NATO, might there not also be a similar threat in the future for our Asian allies and U.S. facilities located there (particularly South Korea, Japan and the Middle East)?

Mr. **Woolsey**. Yes, I believe such a threat is a serious concern. I would be particularly interested in seeing mobile and flexible ATBMs for this reason.

[Additional material submitted for the hearing record follows:]



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A NEW DIMENSION TO SOVIET THEATER STRATEGY*

by Dennis M. Gormley

Conventional wisdom holds that the Soviet Union trails the West in modern warfare technology. But the Soviet Union has already deployed its first highly accurate dual-capable missiles in Eastern Europe. Tied to an offensive strategy emphasizing the pre-emptive employment of massive numbers of high-performance aircraft, these new short-range missiles (SS-21, SS-22, and SS-23) presage an emerging set of Soviet attack options that promise, by the start of the next decade, to turn currently debatable shortcomings in NATO's defenses into clearly dangerous deficiencies.[1]

Belated recognition of this emerging short-range missile threat stems only in part from the West's preoccupation with longer-range SS-20 missiles, which threaten all of Western Europe, the Middle East, China, and Japan from sites within the Soviet Union. NATO also de-emphasized Moscow's retaliation for the Alliance's deployment of Pershing and cruise missiles. The Kremlin's retaliation included the deployment of enhanced-range operational-tactical missiles in East Germany and Czechoslovakia. Rather than worrying aloud about the serious import of these developments and granting Moscow political capital, Western officials represented the new generation of Soviet short-range missiles as a long overdue,

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[1] Although a wide variety of different Soviet delivery systems are referred to in this article, primary attention focuses on Soviet dual-capable (nuclear and nonnuclear) delivery systems with a range no greater than 1,000 kilometers. This restriction necessarily includes "tactical" missiles (e.g., SS-21) organic to Soviet (and Warsaw Pact) divisions; "operational-tactical" missiles (e.g., SS-22 and SS-23) organic to armies and fronts; and dual-capable aircraft organic to theater or regional commands. By way of distinction, Soviet longer-range theater nuclear missiles (e.g., SS-20) are subordinate to the Strategic Rocket Forces, which claim responsibility for nuclear missile systems with ranges greater than 1000 kilometers. The term "short-range missiles" is meant to include tactical and operational-tactical ballistic missiles organic to Warsaw Pact ground formations. The author first drew attention to the implications of new Soviet short-range conventional missiles in Dennis Gormley, "Peace and War: Narrowing the Gap," *The Times* (London), August 7, 1984.

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routine modernization of Soviet tactical nuclear missiles which have been in Eastern Europe for years.[2]

But the Soviet Union's new missiles have a far more serious dimension. NATO has little strategic depth. Most of its highest value military installations (nuclear weapon sites, airfields, air defense sites, and storage depots), a few hundred in number, are within 500 kilometers of the inter-German border. Based in Eastern Europe, new enhanced-range Soviet missiles could easily cover most of these targets. More important, major improvements in missile accuracy and conventional warhead effectiveness suggest that, once the new generation of short-range missiles is fully deployed, such attacks could be conducted without the immense escalatory risks of a nuclear attack.

The Soviet Union is by no means invulnerable. Several prominent weaknesses, among them the questionable reliability of the USSR's reluctant allies, command and control inflexibility under rapidly changing circumstances, and shortcomings in theater reconnaissance capabilities, would probably combine to render any Soviet prospects for a sustained offensive highly uncertain. Ironically, the convergence of these vulnerabilities with the Soviet Union's emerging attack options makes the Warsaw Pact more — not less — ominous an adversary, especially in uncertain crisis situations. Perhaps the best way for Soviet planners to reconcile Warsaw Pact weaknesses is through the achievement of decisive results pre-emptively in the first campaign of a future war, before events can get out of hand.[3]

These developments raise a host of questions, and their answers will undoubtedly influence NATO force planning at least over the next decade. What role will new short-range missiles play in Soviet theater strategy? How have Soviet planners modified their operational concepts of war to exploit the advent of new dual-capable missiles? Given the projected capabilities of dual-capable missiles, what specific NATO vulnerabilities are of prime interest to Warsaw Pact attack planners? Appraising the implications of this new dimension for Soviet theater strategy seems unequivocally compelling. NATO faces hard choices over whether active, passive, or a combination of defensive measures would best cope with the threat of new short-range missiles. This article offers an operational context within which these choices must be considered: that of emerging Soviet nuclear and nonnuclear attack options that exploit inviting NATO vulnerabilities

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[2] See, for example, Hedrick Smith, "U.S. Arms Official Offers View on Talks," *New York Times*, December 7, 1983.

[3] Joshua M. Epstein has observed that pre-emption offers the Soviets a way of accommodating their weaknesses because "a successful preemption nips uncertainty in the bud." See Epstein's *Measuring Military Power: The Soviet Air Threat to Europe* (Princeton: Princeton University Press, 1984), pp. 185-88. Epstein's work, however, only analyzes the role and effectiveness of Soviet tactical aviation; it does not consider the synergistic benefits that would flow from the combined use of conventionally armed missiles and tactical aircraft especially in a pre-emptive role. Benjamin S. Lambeth has also cautioned that Soviet uncertainties can either foster hesitancy or forceful action, depending on the stakes. ("Uncertainties for the Soviet War Planner," *International Security*, Winter 1982/83, pp. 139-66).

Historical Antecedents

Any discussion of emerging Warsaw Pact attack options must be viewed against the broader historical backdrop of a persistent Soviet effort to develop military instruments for deep operations. Attention to the changing nature of Soviet views on modern warfare is especially important in appraising the role of emerging technologies in Soviet theater warfare strategy. All too frequently, Western views of Soviet concepts of warfare are harnessed exclusively to the role of nuclear weapons as developed under Nikita Khrushchev in the late 1950s. It is not the purpose here to argue that the historical antecedents to contemporary expressions of Soviet military thought hold no relevance to the subject of this article; on the contrary, Soviet military theoreticians are loath to discard anything that has stood the test of time. Nevertheless, the Soviet predilection to retain traditions should not lead us to ignore Moscow's acceptance of new military options.

A consistent set of Soviet views about the most probable theater warfare contingencies has emerged from the last three and a half decades of military thought and force development. Broadly outlined, they include three major courses of conflict.

(1) Massive use of nuclear strikes at the outset of conflict to the full depth of involved theaters of military operations (TVDs).[4] Such a contingency would immediately involve the use of Soviet homeland-based strategic nuclear forces against European targets, with follow-up exploitation by Warsaw Pact ground and air forces.

(2) An escalating conflict in which an initial (and relatively short) period of conventional operations precedes an increasingly more widespread use of nuclear weapons. The nuclear phase of such a conflict could proceed immediately to the use of Soviet homeland-based forces, or more likely would begin with tactical nuclear weapons and thereupon escalate rapidly to general nuclear warfare. A different version of such an escalatory conflict might include nuclear operations in one TVD during which only conventional operations were conducted in another TVD.

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[4] Soviet military authors define the TVD as a large geographic area that "permits the concentration and deployment of strategic groupings of forces and the carrying out by them of military operations in accomplishment of strategic missions." (This definition is cited and discussed in Dennis M. Gormley, "Understanding Soviet Motivations for Deploying Long-Range Theater Nuclear Forces," *Military Review*, Vol. LXI, No. 9, September 1981, pp. 20-34.)

(3) A conventional-only conflict, in which major strategic operations are successfully carried out within one or more TVDs without recourse to nuclear weapons.

Naturally, each major contingency calls for a different mix of nuclear and conventional forces. Under the first contingency, short-range nuclear forces organic to Warsaw Pact ground force commanders would play only a secondary role to strategic nuclear forces. Indeed, severe limits in short-range missiles, rockets, and aircraft compelled Soviet planners throughout the 1960s to depend heavily on strategic missiles and aircraft to support front targeting.[5]

The second contingency, in contrast, would require greater numbers and vastly more flexible short-range forces to contend with more varied circumstances. To be sure, the Soviet force development process was already contributing improved military instruments by the mid-1960s; the product-improved Scud-B missile demonstrated an 87 percent increase in range over its predecessor, while the Frog-7 rocket showed a 40 percent increase. The most substantial improvement in front-organic nuclear delivery came in tactical aviation. What had been in the 1960s a force limited in both numbers and range became in the 1970s a force of considerable means. Over the period 1965 to 1977, the offensive load capacity of Soviet frontal aviation in Eastern Europe grew by 90 percent.[6] In about a decade, the Soviet inventory of short-range nuclear delivery systems (Frogs, Scuds, dual-capable aircraft, and nuclear artillery) doubled in size to represent roughly a two and one-half to one advantage over equivalent NATO systems by the mid-1970s.[7]

Surely, Soviet military planners could not hope to succeed in the third contingency — the focus of the balance of this article — without substantial support from highly accurate dual-capable fire support.

There appears to be a relationship between the changing nature of Soviet doctrinal views and the acquisition of supporting short-range forces. It is difficult to discern precisely what factors most influence the development of new Soviet doctrine and supporting military instruments. Nonetheless, the general outlines of the reciprocal relationship between doctrine and technology are evident in the Soviet force development process. In this regard, the force development process reflects a complex, interactive association between doctrine and technology in which, as David Holloway writes, "technological change exerts a determining influence on the methods of warfare, but doctrine has a significant role in adapting those methods to new weapons."[8]

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[5] Joseph Douglass, *The Soviet Theater Nuclear Offensive* (Washington, D.C.: USGPO, 1976), pp. 73-74.

[6] Robert P. Berman, *Soviet Air Power in Transition* (Washington, D.C.: The Brookings Institution, 1978), p. 54.

[7] J. J. Martin, "How the Soviet Union Came to Gain Escalation Dominance — Trends and Asymmetries in the Theater Nuclear Balance," in *The Soviet Asset, Military Power in the Competition over Europe*, edited by Uwe Nerlich (Cambridge: Ballinger, 1983), pp. 110-11, 114-15.

Within this interdependent relationship, other factors impinge upon the force development process.[9] Soviet perceptions of potential adversary doctrinal and technological challenges surely play an important role. Doctrinally, the Soviet Union has witnessed several abrupt postwar shifts in U.S. military policy — Eisenhower's "massive retaliation" and Kennedy's "flexible response" are only the most glaring examples. Technologically, the Soviet military must cope with high levels of innovation and technical virtuosity in Western military developments. Finally, the bureaucratic politics of the Soviet military-industrial complex obviously affect the force development process. Khrushchev used military doctrine to divert resources from the military into the civilian sector of the Soviet economy. And numerous struggles for power and resources have occurred between and within the branches of the Soviet armed forces — all these condition the process of force development.[10]

Former Chief of the General Staff Marshal Nikolai V. Ogarkov views the creation and production of sufficient quantities of new weapons as the starting point of the force development process.[11] Once these quantities are achieved, this "new qualitative condition" influences the development of new forms and methods of combat, as well as the organizational structure of the armed forces. Thus, quantitative and qualitative improvements in short-range forces have occasioned a radical shift in Soviet views on the use of these weapons as instruments of theater strategy. No longer are they seen as just a follow-up force to strategic and long-range theater forces. Instead, especially with the mass introduction of highly accurate conventional missiles, they are now regarded as a means to achieve the decisive results hitherto thought possible only with nuclear weapons.

Contemporary Soviet Theater Strategy

Emerging Soviet military technologies — longer-range, highly accurate, dual-capable delivery systems in particular — foreshadow the capacity to furnish conventional solutions for nuclear problems. Preventing NATO from employing nuclear weapons, the threat that constitutes the heart of NATO's deterrent strategy, forms the crux of the Soviet problem. The solution to this operational conundrum lies in the Soviet force development process. The deployment of enough new weapons in the 1960s enabled Soviet military theoreticians to perfect new forms and methods of combat operations, giving hope that a war could be conducted by stages; a new phase in the process of force development now offers the prospect of conducting decisive missions (such as preventing NATO's nuclear riposte) without using nuclear weapons. Then Minister of Defense A. A. Grechko reflected on the process in his 1975 book when he suggested that

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[8] David Holloway, "Doctrine and Technology in Soviet Armaments Policy," in *Soviet Military Thinking*, edited by Derek Leebaert (London: George Allen and Unwin, 1981), p. 266.

[9] For a detailed discussion of these factors, see Dennis M. Gormley, et al., *Soviet Perceptions of and Responses to U.S. Nuclear Weapon Development and Deployment*, Pacific-Sierra Research Corporation, PSR Report 1211, June 1982.

[10] Edward L. Warner, *The Military in Contemporary Soviet Politics* (New York: Praeger, 1977), pp. 153-55 and 175-88.

[11] N. V. Ogarkov, *Always in Readiness to Defend the Fatherland* (Moscow: Voyenizdat, 1982), p. 83.

> due to a *qualitative* improvement in conventional means of destruction and the *increase in units and formations,* there has been a great improvement in the fire, shock and maneuver capabilities of troops, which permits assigning them very decisive missions on the battlefield which they are capable of accomplishing without resorting to nuclear weapons.[12] (Emphasis added.)

Yet, the quality and quantity of new conventional weapons represent necessary, if insufficient, conditions to bring the latest phase in the force development process full cycle. At least two additional conditions seemed in order: the necessity, first, to modify and improve operational concepts of war that would materially capitalize on the availability of new and better conventional weapons and, second, to reshape the Soviet armed forces to enable them to execute these newly accommodated operational concepts.

To that end, the Soviet military instituted the following operational and organizational changes in the mid- to late 1970s:

(1) Soviet planners reorganized the air force and air defense force to provide greater flexibility in employing long-range strike aircraft, organic close-air support, and air defense of the ground forces. Consistent with these changes, they refined the air operation, which, in effect, substitutes for an initial mass nuclear strike against high-value military targets throughout the depth of NATO's defense.[13]

(2) They revised the World War II "mobile group" concept in the guise of operational maneuver groups (OMG). Broadly speaking, the function of the OMG is to penetrate NATO lines rapidly, create

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[12] A. A. Grechko, *The Armed Forces of the Soviet State* (Moscow: Voyenizdat, 1975), translated by U.S. Air Force, Soviet Military Thought Series, No. 12 (Washington, D.C.: Government Printing Office, n.d., pp. 147-48).

[13] See, for example, Tommy L. Whetton, "The Changing Role of Air Power in Soviet Combined-Arms Doctrine," an unpublished paper presented at the Fourteenth Annual Convention of the American Association for the Advancement of Slavic Studies, October 15, 1982, especially pp. 8-10.

paralysis and eventually complete collapse before NATO can employ nuclear weapons.[14]

(3) They streamlined logistics command and control and prestocked large quantities of ammunition (sixty to ninety days), fuel (ninety days), and other war supplies in forward areas. In the past, NATO could count on detecting an impending offensive by monitoring the movement of supplies from rear-area dumps to forward positions. Such an expectation is no longer the case.[15]

(4) Major improvements in the mobility and firepower of Soviet airborne divisions coupled with helicopter-borne air-assault brigades suggested a highly coordinated approach to deep-penetration attacks against NATO high-value targets.

(5) Now that front commanders possessed weapons with ranges capable of influence well beyond a front's area of interest, the general staff saw the need to coordinate the activities of several fronts. To that end, Soviet planners re-established the concept of the High Command in the TVD, which is designed to control the complex timing and execution of multifront air, missile, airborne, and ground activity of a conventional strategic offensive in a continental TVD.[16] This command and control feature, together with the restructuring of air and air defense forces, places Soviet and Warsaw Pact forces in a more streamlined posture to respond to modern war conditions. Principally, those conditions dictate surprise and pre-emptive action.

The operational objectives of contemporary Soviet theater strategy are simple to conceive but complex to execute. The massive nuclear and escalating contingencies held a straightforward solution to the problem of disrupting NATO's nuclear weapons, air forces, and command and control centers: massive missile- and air-delivered nuclear weapons employed pre-emptively at the start, or soon after the start, of war. A conventional solution to a nuclear problem would require a qualitatively new role for a front commander's short-range delivery systems (especially missiles) if Soviet planners were to be confident of success.

The Soviet notion of a strategic operation in the Western TVD envisions a decisive period of conventional operations causing a rapid collapse of Western defenses, especially NATO's ability to escalate to the nuclear level. How much of NATO's nuclear capability must necessarily be disrupted to achieve disintegration of NATO's political will is unknowable; presumably, the higher the percentage the lower the NATO incentive to escalate. Soviet expectations of executing such a bold strategy hinge on employment of a formula that not only exploits improved mobility, firepower, and weapon accuracy but also denies NATO the use of its own improved military capabilities before they can be fully mobilized.

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[14] For a more detailed discussion, see Phillip H. Petersen and John G. Hines. "The Conventional Offensive in Soviet Theater Strategy," ORBIS, Fall 1983, pp. 695-739.

[15] Changes in the Warsaw Pact logistics structure are reported in U.S. Department of Defense, *Soviet Military Power 1985* (Washington, D.C.: USGPO, 1985), pp. 65-66. The value of Warsaw Pact logistics activity as a warning indicator is discussed in William J. Lewis, *The Warsaw Pact: Arms, Doctrine, and Strategy* (Cambridge, Mass.: Institute for Foreign Analysis, 1982), p. 234.

[16] For a detailed discussion, see Gregory C. Baird, "Glavnoe Kommandovanie: The Soviet Theater Command," *Naval War College Review*, May-June 1980, pp. 40-48; and "The Soviet Theatre Command — An Update," NWCR, November-December 1981, pp. 90-94.

The Soviet operational concept entails employment of division- and perhaps army-sized OMGs to prevent NATO from organizing a coherent in-depth defense. Emphasizing surprise and high-speed advances, OMGs would attempt to penetrate deep into NATO's rear to disrupt or destroy nuclear weapons, aircraft, logistic support, command and control centers, and reserve and withdrawal forces. Success would depend on important variables, most critically winning the counter-air campaign. The effective commitment of OMGs early in a theaterwide campaign presupposes a successful air operation against NATO to reduce the chance of air attacks on OMGs before, during, and after their insertion. Soviet planners view NATO's air assets as having the requisite speed and firepower to react decisively to OMG penetrations. Equally important, the air operation would be expected to disrupt NATO's air defense network to enable friendly fighter-bombers, helicopters, and transport aircraft to accompany or follow OMG penetrations. Airborne and helicopter assaults simply cannot be executed until the air battle is won.

Many skeptical Western analysts question whether the Warsaw Pact could achieve the air superiority needed to enable deep raids behind NATO's forward lines and whether a Soviet junior officer corps practiced in conformity to predetermined war plans possesses the initiative and flexibility to react decisively under such complex battle conditions.[17] However legitimate, these questions focus on the kind of contingency the Soviet Union least prefers: one in which NATO has had sufficient time to mobilize its superior military potential. Soviet military planners share the skeptics' doubts over Warsaw Pact prospects under these conditions. Their solution lies in exploiting the "initial period of war" when the number of installations (targets) that must be attacked to achieve decisive results is relatively small compared with the targeting requirements of the post-mobilization period. In his 1974 book, *Initial Period of War,* General S. P. Ivanov emphasizes the role of surprise

> to inflict a decisive defeat on the enemy's first strategic echelon; and then, by continuing with a speedy offensive into the depths of his territory, to complete

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[17] These doubts were expressed by Lt. Col. Gunter Lippert at the German Strategy Forum held in June 1984, as reported in Elizabeth Pond, "Hints of Soviet Fast-Strike Force Make NATO Think Twice on Europe Defense," *Christian Science Monitor,* July 10, 1984.

> his total defeat before he was able to mobilize and make use of his military and economic potential.[18]

A short, decisive campaign also helps to compensate for shortcomings in the flexibility of the officer corps' lower ranks (through intensive preplanning) and the uncertain reliability of the Soviet Union's Warsaw Pact allies (as a short war reduces their opportunities to opt out).[19]

What are the constituents of this decisive, pre-emptive attack during the initial period of war? In the late 1970s, Western analysts accorded much attention to the role of Soviet Frontal Aviation in conducting a massive conventional air operation against NATO's nuclear forces, command posts, and airfields at the beginning of hostilities.[20] To be sure, the 1970s brought dramatic improvements to Frontal Aviation's assets: nearly a doubling in offensive load capacity and 70 percent more versatility over the preceding generation of aircraft.[21] By 1978, the Central Intelligence Agency estimated that Frontal Aviation's share of Soviet defense spending was about twice that of the Strategic Rocket Forces, a figure aptly reflecting the increased burden assumed by the operational front commander for furnishing pre-emptive shock power at the outset.[22]

But it is shortsighted to view Frontal Aviation as the linchpin of Soviet theater warfare strategy.[23] Although the air operation does substitute for the initial mass nuclear strike of the massive nuclear and escalatory contingencies, its constituents are more varied and complex than is implied by its appellation. Indeed, before Frontal Aviation's attack through selected NATO air defense sectors, tactical and operational-tactical missile forces would strike NATO's air defenses and other high-priority NATO targets with improved conventional munitions, while electronic warfare aircraft would disrupt the NATO air defense radar and communications network. After Frontal Aviation's attack, longer-range aircraft of the Supreme High Command (including SU-24 Fencers and TU-26 Backfires, for example) would attack high-priority targets to the depth of the theater. This panoply of missile and air activity would precede and thereby enable, having achieved air superiority, the initiation of warfare on the ground by an equally varied mix of airborne, air assault, and

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[18] S. P. Ivanov, *Initial Period of War* (Moscow: Voenizdat, 1974) as cited in P. H. Vigor, *Soviet Blitzkrieg Theory* (New York: St. Martin's Press, 1983), p. viii.

[19] A. Ross Johnson, Robert W. Dean, and Alexander Alexiev, *East European Military Establishments: The Warsaw Pact Northern Tier* (New York: Crane-Russak, 1982), p. 148.

[20] For more details see Phillip A. Petersen, *Soviet Air Power and the Pursuit of New Military Options*, Studies in Communist Affairs, Vol. 3 (Washington, D.C.: Government Printing Office, 1979), passim.

[21] Berman, *Soviet Air Power in Transition*, p. 31.

[22] Central Intelligence Agency, National Foreign Assessment Center, *Estimated Soviet Defense Spending: Trends and Prospects* (Washington, D.C.: Government Printing Office, 1978), pp. 3-4.

[23] For example, see Epstein, *Measuring Military Power*, pp. 5-7. Epstein's work was completed prior to widespread recognition of the emergence of dual-capable short-range ballistic missiles.

OMG formations.[24] If any part of the air operation's force constituents merits the epithet "linchpin," it is the emerging force of highly accurate short-range ballistic missiles now being deployed in increasing numbers with Soviet ground-force units in Eastern Europe.

The Role of Soviet Short-Range Missiles

Growing Soviet confidence in the shorter-range theater forces became evident in the mid-1970s. Lectures at the Soviet General Staff Academy during this period reveal that Soviet planners thought limited nuclear war feasible even in central Europe.[25] Such a conflict would be limited in that only front-subordinated short-range nuclear systems—not the entire arsenal or even limited portions of the strategic arsenal—would be used initially after an indeterminate period of conventional warfare. The prospects for escalation to strategic nuclear conflict, especially in the Western TVD, were viewed as strong. Confidence that operational-tactical nuclear pre-emption could be conducted as a separate phase grew largely out of the significant improvement in the number, combat radius, and offensive load capacity of dual-capable Frontal Aviation. Moreover, Frontal Aviation was expected to bear the brunt of conventional strike missions during the conventional phase of operation.

In contrast, the tactical and operational-tactical missile force experienced hardly any development during the 1960s. A recent examination of the pattern of Soviet land-based missile development programs for 1950 to 1976 reveals a consistent growth pattern with one important exception: a hiatus in development activity from 1962 to 1971, accounted for by termination of upgrade programs for short-range missiles.[26] While the Frog-7 (the last of the tactical free-flight rockets deployed in 1965) and Scud-B (operational-tactical ballistic missile deployed also in 1965) had demonstrated modest range improvements over their predecessors, poor accuracies prevented their playing an active role in the nascent conventional pre-emption phase. The accuracy dilemma also held true for the SS-12 Scaleboard, which was deployed in 1968 exclusively in the Soviet Union despite its operational-tactical designation and organic relationship to fronts. Without a solution to the accuracy dilemma — a technologically challenging task indeed — Soviet defense decision makers probably saw little purpose in further development work simply to improve operational-tactical missile range, reliability, and readiness, especially during a decade of significant growth in resources for the Strategic Rocket Forces.

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[24] Petersen and Hines, "Soviet Theater Strategy," pp. 708-709.

[25] As cited in Notra Trulock III, "Weapons of Mass Destruction in Soviet Military Strategy," an unpublished paper presented at the Joint Conference on Soviet Military Strategy in Europe, sponsored by the Boston Foreign Affairs Group and the Royal United Services Institute for Defence Studies on September 24-25, 1984, Oxford, England, pp. 77-78.

[26] Stephen M. Meyer, "Soviet Theatre Nuclear Forces, Part II: Capabilities and Implications," *Adelphi Papers*, No. 188 (London: IISS, 1983/84), p. 2.

Having skipped a new generation of short-range missiles in the 1960s, the Soviet Union initiated new development programs in earnest beginning in 1971 (SS-21) and continuing into the decade (SS-22 in 1973 and the SS-23 in 1975).[27] It appears that the initial version of all three missiles did not possess the terminal effectiveness (a combination of high accuracy and tailored munitions) needed for full-scale conventional use.[28] But by the end of the decade, follow-on versions apparently demonstrated major improvements in guidance and munition effectiveness. A 1979 partially declassified threat briefing by the U.S. Tactical Air Command reports that

> previously, Soviet SRBMs [short-range ballistic missiles] were considered primarily a nuclear threat. However, recent evidence indicates the Soviets may be developing a credible conventional SRBM capability against a variety of threats, including airfields.[29]

More recently, NATO officials revealed that the Soviet military is developing submunition payloads for the SS-22 and SS-23 missiles, while the SS-21 is already deployed with such a conventional payload.[30] As far as improved accuracy is concerned, the U.S. Undersecretary of Defense for Research and Engineering recently disclosed that upgraded models of the SS-21, SS-22, and SS-23 have accuracies permitting their payloads to hit within thirty meters of their targets.[31] This increase represents an advancement over their predecessors (Frog, Scaleboard, and Scud) by roughly a factor of twenty-five.[32] And by no means would this force represent a terminal point in force development. In discussing evolutionary improvements in conventional weapons in general, one senior

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[27] Ibid., p. 56. Midpoint on the uncertainty scale has been selected as the starting point.

[28] Ibid., p. 54. The author reports CEP accuracies (averaged) of 200, 300, and 400 meters for the SS-21, SS-22, and SS-23, respectively.

[29] Quoted in William Arkin and Jeffrey T. Sands, "The Soviet Nuclear Stockpile," *Arms Control Today*, June 1984, p. 5.

[30] Soviet improved conventional munitions for the SS-21, SS-22 and SS-23 are reported in *International Defense Review*, Vol. 4, 1984, p. 373. See also *Soviet Military Power 1985*, n. 15, p. 38.

[31] The defense official was Richard D. DeLauer, as reported by Walter Andrews, "Allies' Weapons Said to be Inadequate to Threat of New Soviet Missile Power," *Washington Times*, November 1, 1984. An accuracy of fifty yards is reported for the SS-21 in "Missile Deployment Strains U.S.-European Alliance, Tass Claims," *Washington Times*, May 30, 1984. Terminal guidance for ballistic missiles such as the Pershing II produce accuracies on the order of thirty to fifty meters. Moreover, current U.S. developmental programs for cruise missiles promise CEPs of three meters or less. See *Armed Forces Journal International*, March 1983, p. 80.

[32] Frog, Scaleboard, and Scud accuracy estimates (800, 463-927, and 570-900 meters, respectively) are derived from Secretary of Defense, *The Effectiveness of United States Military Aid to Israel (ISMILAID)*, Vol. 1, December 1974, declassified, p. IV 80; and Department of State, *Memorandum for the Verification Panel Working Group*, October 2, 1972, declassified, p. 23.

Soviet military observer expects "that the new generation of armaments will be superior to the previous in terms of range several times over, in power tens of times, and in accuracy hundreds of times."[33]

The emerging capacity of new Soviet missiles has been obscured by political events surrounding their introduction into the Soviet forces in Eastern Europe. In October 1983, Moscow announced that the Soviet Union would deploy "enhanced range operational-tactical missile complexes" in East Germany and Czechoslovakia in retaliation for NATO's deployment of Pershing II and cruise missiles. Although the Western response mistakenly (or perhaps intentionally) described the Soviet retaliation as including SS-21, SS-22, and SS-23 missiles (when, in fact, the tag "enhanced range operational-tactical" probably refers to the SS-22, or possibly the SS-23, but certainly not the "tactical" SS-21), it avoided any mention of the new conventional role for these missiles; instead it drew attention to and confirmed the Soviet admission that nuclear warheads are stored routinely with Soviet units in Eastern Europe.[34]

The 120-kilometer range SS-21 ballistic missile is replacing the 70-kilometer range Frog-7 in Soviet divisions. All of the seventy-six Soviet Frog launchers with Soviet divisions in East Germany have apparently been replaced by the SS-21 system at a reported rate of four per month.[35] Another 240 or so Frog launchers are deployed elsewhere in Eastern Europe.

The army- and front-level SS-23 missile is slated to succeed the Scud missile. About 300 Scud launchers are deployed throughout Eastern Europe. If deployment of the SS-23 begins there in 1986 at a pace similar to the SS-21's, all Soviet Scud brigades in East Germany could be fully converted to the new missile by 1989. The new missile's 500-kilometer range is 200 kilometers greater than that of the Scud.

The front-level, 900-kilometer range SS-22 missile replaces the SS-12 Scaleboard. It appears that the SS-22 does not represent a wholesale generational change over the SS-12, in that it uses the same launcher and has no reported improvement in range.[36] This missile probably embodies the heart of the Soviet retaliation for Pershing and cruise missile deployments. The full extent of its deployment to East Germany and Czechoslovakia is unclear, but it signals the first time that missiles of this range have been located outside Soviet borders. From launch locations in East

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[33] General-Major I. Vorob'ev, "Modern Weapons and Tactics," *Krasnaya Zvezda,* September 15, 1984, p. 2.

[34] "U.S.: Nuclear Warheads in E. Europe," *Washington Post,* June 4, 1983.

[35] Michael Getler, "New Generation of Soviet Arms Near Deployment," *Washington Post,* October 11, 1983. Getler notes that the Soviets were adding four new SS-21 missile launchers per month in East Germany, and that thirty to fifty were believed deployed at that time. Assuming that rate was continued, all units in CSFG should currently have SS-21 (vice Frog-7) launchers.

[36] *International Defense Review,* see n. 30.

Germany, the SS-22 extends Soviet operational-tactical missile coverage to NATO Europe's rear areas; its movement forward also avoids the loss of surprise that would result from the 700-kilometer trek from the western USSR into Eastern Europe.

In addition to the qualitative improvements, evidence shows an increase in the number of launchers organic to a Soviet front. Army- and front-subordinated Scud brigades are now equipped with twelve to eighteen launchers; the higher number represents the addition of another two-launcher battery to each of the brigade's three battalions.[37] This growth appears similar to the incremental approach employed to expand Scud brigades from six to nine launchers during the 1960s and from nine to twelve launchers during the 1970s.[38] Such growth in short-range missile launchers would serve two closely related purposes: not only would it increase the number of launchers available for conventional missions, but it would compensate for the need to withhold perhaps one-third of the force to enable a rapid transition from conventional to nuclear warfare. Just as with dual-purpose Frontal Aviation, the advent of truly dual-capable missiles implies a need to deal with the transition dilemma. And despite strong Soviet interest in a conventional-only contingency, Soviet planners remain resolute in conveying the threat of pre-emptive theaterwide use of nuclear weapons should NATO be seen fit to employ what remains of its own nuclear capability after a conventional campaign.[39]

Soviet military planners view the mass introduction of qualitatively new missiles into Soviet ground-force formations as the means to achieve the kind of decisive effects previously the exclusive domain of nuclear weapons. When still chief of the General Staff, Marshal Nikolai Ogarkov described the implications of this "qualitative leap" in conventional weapon effectiveness in a May 9, 1984, interview in the Soviet military newspaper *Krasnaya Zvezda:*

> Raid changes in the development of conventional means of destruction and the emergence in the developed countries of automated search and destroy complexes, long-range high-accuracy terminally guided combat systems, unmanned flying machines and qualitatively new electronic control systems make many types of weapons global and make it possible to sharply increase (by at least one order of magnitude) the destructive potential of conventional weapons, bringing them closer, so to speak, to weapons of mass destruction in terms of effectiveness. The sharply increased range of conventional weapons makes it possible immediately to extend active combat operations . . . to the whole country's territory, which

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[37] FM-100-2-3, *Soviet Army Troops Organization and Equipment,* Coordinating Draft, August 1982, pp. 4-177. Launcher expansion is also reported in *Soviet Military Power 1985,* see n. 15, p. 38.

[38] *Development of the Soviet Forces in Our Sphere of Interest During the Past 20 Years,* Headquarters, Norwegian Defense Command, March 8, 1985, translated by the Norwegian Embassy, Washington, D.C.

[39] CPT 1st Rank L. I. Ol'shtynskiy, *Cooperation of the Army and Navy* (Moscow: Voyenizdat, 1983), p. 7.

> was not possible in past wars. This qualitative leap in the development of conventional means of destruction will inevitably entail a change in the nature of the preparation and conduct of operations. This, in turn, predetermines the possibility of conducting military operations using conventional systems in qualitatively new, incomparable, more destructive forms than before. There is a sharp expansion in the zone of possible combat operations and the role and significance of the initial period of the war and its first operations become incomparably greater.[40]

The Soviet force development process dictates that qualitatively new means deployed in sufficient quantities ought to engender changes in the forms and methods of combat operations. Of special note here is Ogarkov's belief that long-range conventional weapons can immediately — in the first operations of the initial period of war (that is, before the enemy has fully mobilized) — achieve levels of effectiveness aproaching those of nuclear weapons.

The necessity to exploit the initial period of war is dominated by the requirements of the air operation. No longer can forward-based short-range missiles remain dormant during the early hours of war, as was the expectation for such forces during the 1960s and 1970s. The modern air operation has become, in effect, an operational surrogate for the initial mass nuclear strike; the success of subsequent ground operations rests on the air operation's achieving pre-emptive shock effect on an unprepared NATO. In this regard, an air operation's timing is crucial. In fact, the first shots of a war in Europe today would likely consist of an air operation's leading edge attacks by conventionally armed short-range missiles. And the overall operation would *precede* any contact between first-echelon Warsaw Pact ground units and NATO covering forces by at least a couple of hours.[41]

Pre-emptive incentives are also manifest in changes in Soviet fire-support concepts. To exploit the effectiveness of new conventional missiles, especially as they act in concert with improved air- and artillery-delivered conventional firepower, Soviet military planners have introduced a new conventional fire-support concept. Soviet fire-support doctrine traditionally included three phases: "fire preparation of the attack," initiated shortly before Soviet forces engage enemy defenses; "fire support of the attack," undertaken as Soviet forces penetrate enemy defenses; and "fire accompaniment," to support increasingly deeper exploitation of the enemy's rear areas.[42]

But, in view of the potential impact that new longer-range conventional weapons can have at the very beginning of war, Soviet planners have adopted a new, preliminary fire-support phase called "fire support of advance from the depths." This new phase calls for conventional strikes against deep-based NATO aircraft and nuclear systems immediately as Warsaw Pact forces depart their initial assembly areas and move to the front where they can begin to engage enemy defenses.[43]

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[40] N. V. Ogarkov, *Krasnaya Zvezda*, May 9, 1984, translated by BBC Monitoring Service (SU/7/639/C/10), May 9, 1984.

[41] Petersen and Hines "Soviet Theater Strategy," p. 709.

[42] Ibid., pp. 711-714.

This new conventional fire-support phase is strikingly similar in design to a pre-emptive nuclear strike. Indeed, because Soviet planners see many new conventional weapons drawing closer to nuclear weapons in effectiveness, the launching of pre-emptive conventional fire strikes against equally potent enemy weapons is increasingly important.[44] Accordingly, an offensive operation would begin with

> strikes of all types of weapons and the resolute attack of tank and motorized rifle subunits. . . . It [a fire strike] is executed on the march or from a position of direct contact with the opponent. If nuclear weapons are used, the first way [that is, immediately after departure from assembly areas] is the basic one. *It is also advantageous when highly accurate conventional weapons are widely used,* since it permits maintaining to a great degree the combat capability of troops until the beginning of the attack.[45] (Emphasis added.)

Thus, the need to achieve operational surprise (and, thereby, pre-emption of the enemy's nuclear and advanced conventional systems) appears among the primary motivations for recent changes in Soviet fire-support concepts.

Of operational significance to surprise is Defense Minister Ustinov's 1982 declaration of the highest peacetime readiness norm ("combat alert duty") for "troops and naval forces stationed on the forward edge of our motherland and the socialist community."[46] Previously, only the Strategic Rocket Forces and, occasionally, SSBNs and the National Air Defense Troops have been singled out for the performance of combat alert duty.[47] Upgrading ground force readiness presumably includes corresponding improvements in organic missile readiness. Indeed, a segment of Soviet nuclear forces in Eastern Europe has reportedly been placed on "quick alert" for the first time.[48] This change in Soviet operational planning may relate to the introduction of new enhanced-range missiles into Eastern Europe in late 1983; it would roughly correspond to the quick-reaction alert status of a portion of NATO's Pershing missiles and dual-capable aircraft. Nonetheless, short-range missiles (nuclear *and* conventional) on alert status would serve Soviet planners admirably in their quest to achieve pre-emptive surprise in the air operation and to furnish "fire support of advance from the depths." Such changes, of course, are wholly consistent with Marshal Ogarkov's emphasis on the exigencies of the initial period of war.

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[43] Ibid., p. 712.

[44] This point is made by Vorob'ev, "Modern Weapons and Tactics."

[45] Colonel P. Konoplis and Colonel A. Mal'shev, "Modern Offensive Battle," *Military Herald,* February 1984, as translated in *Strategic Review,* Spring 1984, p. 96.

[46] D. F. Ustinov, *We Serve the Motherland and the Cause of Communism* (Moscow, 1982), p. 82, as cited in James M. McConnell, "The Soviet Shift in Emphasis from Nuclear to Conventional," Center for Naval Analyses, CRC 490-Vol II, June 1983, pp. 27-28.

[47] Ibid., p. 27.

[48] Jay Mallin, Sr., "Russia at High Level of Battle Readiness," *Washington Times,* July 26, 1984.

In sum, the Soviet Union is investing heavily in a new generation of short-range ballistic missiles to enable missiles based in Eastern Europe to participate fully in conventional pre-emption. To the extent that this force can contribute to the goal, Soviet planning confidence in executing the conventional-only contingency will grow. In fact, emerging missile improvements represent only the latest addition to the current cycle in the Soviet force development process: while Frontal Aviation's new weapon systems and technologies motivated the development of improved forms and methods of combat operations (conventional pre-emption via the air operation), highly accurate operational-tactical missiles are influencing the perfection of these operational concepts.

Emerging Nuclear and Nonnuclear Attack Options

A quick look at a map of Europe reveals why the combination of increased range, high accuracy, and rising launcher numbers for an emerging force of missiles based in Eastern Europe could make a substantial difference in Soviet war planning. Most of the West's highest value military installations in NATO'S central region are clustered within 500 kilometers of the inter-German border. As illustrated in figure 1, new Soviet missiles based in East Germany and Czechoslovakia could easily reach nearly all of these installations. To draw attention to an increasingly unstable set of NATO vulnerabilities, the remainder of this article describes NATO targets of greatest interest to Soviet planners and then illustrates possible Soviet attack options.

NATO's Nuclear Weapons

Perhaps the greatest difference between the NATO and Warsaw Pact approaches to targeting lies in NATO's intentional avoidance of striking the Pact's nuclear weapons during conventional operations (for fear of creating insurmountable escalatory incentives), while the Warasw Pact places NATO's nuclear arsenal at the top of its target list.[49] For the NATO central region (West Germany, the Netherlands, and Belgium), the

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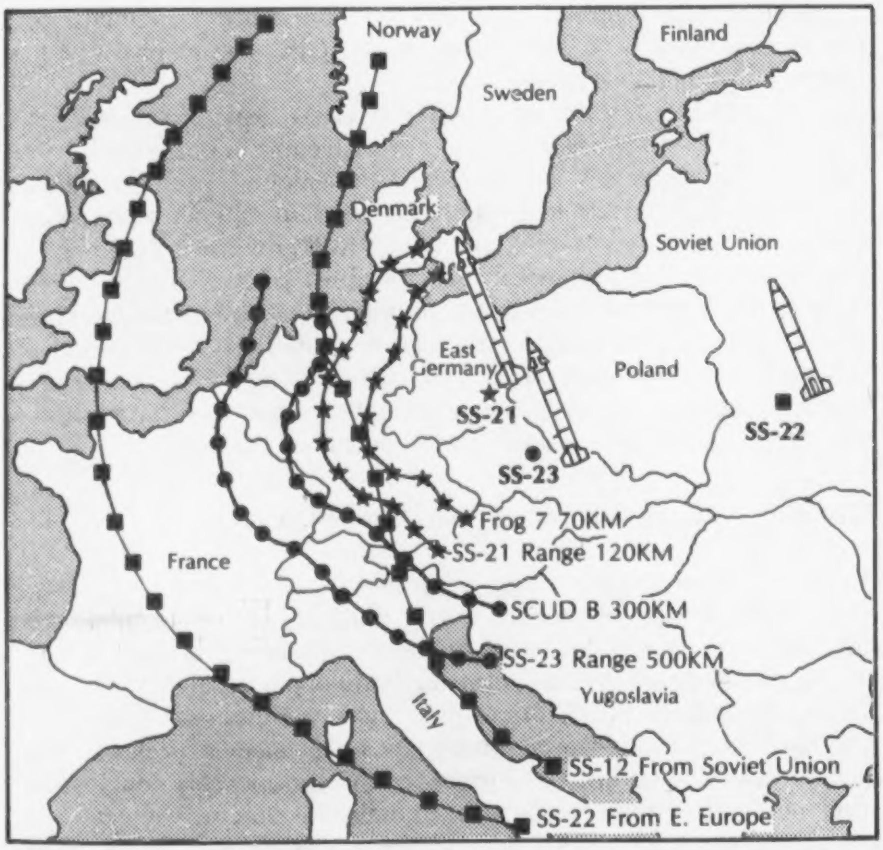
[49] See, for example, Col. (DPL.) Pilot Aleksander Musial, "The Character and the Importance of Air Operations in Modern Warfare," *Polish Air Force Air Defense Review*, No. 2, 1982, translated by the Soviet Studies Research Centre, Royal Military Academy, Sandhurst, UKTRANS No. 138, p. 3.

Figure 1
Range Arcs of New Soviet Missiles Stationed in Eastern Europe


Norway
Finland
Sweden
Denmark
Soviet Union
East Germany
Poland
SS-21
SS-22
SS-23
Frog 7 70KM
SS-21 Range 120KM
France
SCUD B 300KM
SS-23 Range 500KM
Yugoslavia
Italy
SS-12 From Soviet Union
SS-22 From E. Europe

target set comprises roughly fifty nuclear storage sites, ten air bases with dual-capable fighter-bombers and collocated nuclear bombs, and roughly twenty garrisons housing Pershing, Lance, and ground-launched cruise missile systems.[50] But Soviet planners do not view each of these eighty installations with equal gravity because they select the main kinds or nodes in various target sets for priority attention.[51] Plausibly, the most threatening of the fifty nuclear storage sites (for example, those stockpiling Pershing and GLCM warheads) and missiles and aircraft on quick-reaction alert status might be singled out for special attack consideration.

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[50] Various sources, including Meyer, "Soviet Theater Nuclear Forces," p. 24; map entitled "Nuclear Arms in West Germany," in *Washington Post,* November 1, 1981; *The Military Balance* (London: IISS, 1983-84), pp. 9-10 and 25-42.

[51] W. T. Lee, "Trends in Soviet Strategic Ballistic Missile Forces," paper presented at a conference sponsored by the USAF Assistant Chief of Staff for Intelligence, "The Soviet Union: What Lies Ahead? Military-Political Affairs in the 1980's," September 25-27, 1980, p. 13.

The vulnerability of NATO's nuclear deterrent is most sensitive to whether Western decision makers act in time to disperse nuclear weapons, aircraft, and missiles from their peacetime bases. For example, dispersal in the central region would render Soviet pre-emptive strike calculations dubious at best by multiplying the nuclear target set from eighty fixed installations to well over 300 mobile (and thus more survivable) field units.[52] For this reason, many view the rapid achievement of nuclear dispersal as the most sensible course for NATO decision makers; such an act would at once produce substantially greater survivability for nuclear forces and lessen pressures for early nuclear use.[53]

Others are not so sanguine. They deem the alert and dispersal of nuclear weapons so provocative as to create uncontrollable incentives for the Warsaw Pact to attack in a crisis.[54] Critics maintain that nuclear dispersal provokes attack because the widespread distribution of nuclear warheads throughout NATO forces is fundamentally no different than a delegation of authority to lower-level military authorities to use such weapons.[55]

A complicating factor is the lengthy time it could take to complete the nuclear dispersal process. Because of the perceived sensitivity of nuclear dispersal, NATO forces are not practiced in its execution. Preparing, outloading, and dispatching large numbers of nuclear weapons could take nearly a full day. Most important, nuclear force survivability is materially threatened during dispersal, a process which exposes many weapons and places truck convoys, handling equipment, and personnel at risk. Even light conventional missile attacks would do enormous damage during this period simply by delaying the dispersal process.

NATO's Air Defenses

Mastery of the air is essential to achievement of Soviet objectives in a major contingency in Central Europe. The NATO air defense system in the central region embodies air defense forces (surface-to-air missiles and interceptors), surveillance capabilities, and the command, control, and communications (C^3) network. Measured in sheer numbers, the air defense forces dominate the overall target set, but the Achilles' heel lies in the C^3 network.

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[52] The proliferation of NATO nuclear units results from the distribution of nuclear weapons from fifty storage sites to numerous firing units, such as individual firing batteries of dual-capable artillery battalions.

[53] Walter Slocombe, review of *Command and Control of Nuclear Forces* (New Haven and London: Yale University Press, 1983), by Paul Bracken, *Survival*, September/October 1984, p. 240.

[54] *Lab News*, Sandia National Laboratories, Vol. 37, No. 8, April 26, 1985, p. 9.

[55] Bracken, *Command and Control*, passim.

Roughly fifteen C^3 sites form the most vulnerable link in the central region's air defenses. Headquarters, Allied Air Forces, Central Europe (AAFCE), whose static war location is Irwin Bunker, some sixty kilometers northwest of Ramstein Air Base in West Germany, provides overall general direction.[56] The two Allied Tactical Air Force (ATAF) commands (two ATAF supporting the Northern Army Group and four ATAF supporting the Central Army Group) divide regional direction of the Center's air defense forces and surveillance assets. Perhaps of greatest importance to cohesive air defense operations are three Sector Operations Centers (SOCs), whose loss could be equated with the loss of air traffic control at a major international airport. Finally, nine fixed Control and Reporting Centers (CRCs) link surveillance, warning, and air defense activities into a management scheme consisting of engagement zones within which interceptors and SAMs are allocated. It would appear that CRCs could furnish some back-up support should SOCs come under effective attack.

A system of fixed and mobile surveillance radars provides vital early warning of enemy air attack. The NATO Air Defense Ground Environment (NADGE) surveillance system consists of at least five 412L fixed radar sites, suported by sixteen mobile 407L Control and Reporting Posts (CRPs). A network of mobile radars, operated by the German defense forces, also supplies radar coverage near the inter-German border. Although major portions of the warning and surveillance network are vulnerable (either because their positions are fixed or because active electronic emitters attract attention), NATO's Airborne Warning and Control System (AWACS) will partially offset this shortcoming through its more survivable mode of deployment.

The Central Region's air defense forces include two major components: (1) interceptor aircraft, based at roughly ten airfields (capable of dispersing to other airfields, if necessary), each of which has some level of air defense support to cope with enemy aircraft attacks; and (2) high- and low-altitude SAMs forming the Nike-Hercules (being replaced by Patriot) and Hawk air defense belts. The Hawk belt has nearly 500 launchers while the Nike-Hercules has some 450.[57] For targeting, however, a Soviet planner might view the entire Hawk belt as eighty-three battery-sized targets. Applying this same formula to the Nike-Hercules belt would result in forty-nine battery-sized targets. All targets are not of equal value; the Soviet air operation would attempt to establish perhaps as many as five corridors, making large-scale suppression of the NATO air defense system unnecessary.

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[56] The discussion of NATO air defense is based largely on Dan Boyle, "C^3 — The Essential Ingredient to Air Defense," *International Defense Review*, 1978, pp. 860-64.

[57] *The Military Balance*, pp. 9, 26-38. The counting rule formula for Hawk is six launchers per battery times three battalions or eighteen launchers per battalion. Nike-Hercules is nine launchers per battery times four batteries per battalion. Counting rules are found in Epstein, *Measuring Military Power*, p. 192.

Major NATO Command and Control Facilities

Two parallel command structures direct NATO combat operations above corps level. One supports national C^2 needs; in the case of the United States, this section includes the U.S. European Command, U.S. Air Force Europe, and U.S. Army Europe. The other — Allied Command Europe — is headed by the Supreme Headquarters, Allied Powers Europe (SHAPE), and includes Allied Forces Central Europe (AFCENT), Allied Air Forces Central Europe (AAFCE), the Northern and Central Army Groups and their corresponding allied tactical air forces (two and four ATAF respectively). In wartime, each of these ten major commands deploys to an alternate, hardened command post, perhaps best illustrated by Irwin Bunker, which houses both AFCENT and AAFCE.[58]

Mobilization and Logistics

The aim of the Warsaw Pact air operation is not simply to achieve mastery of air but to exploit that achievement to destroy NATO's will to resist. Besides denying NATO its ability to threaten any Soviet-led invasion with a nuclear riposte, perhaps the most important objective is to sever NATO's reinforcement potential. Both Soviet and Western planners are intimately acquainted with the extent to which NATO's conventional defense hinges on early response to strategic warning. Studies of changing NATO / Warsaw Pact force ratios resulting from competitive mobilization demonstrate that the West's prospects (albeit only a bean count) materially improve with ten to thirty days of reinforcement.[59]

Unfortunately, NATO's reinforcement process invites attack for reasons quite separate from an attack's inherent operational value. For one, reinforcement facilities are few (perhaps a couple of dozen installations) and soft in constitution (military equipment in warehouses). Equally important, massive airlifting of troops and mating with prepositioned equipment are complex activities under the best conditions, no less in time of crisis or war. Opportunities abound to disrupt and delay such intricate activities.

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[58] Boyle, "The Essential Ingredient," p. 862.

[59] For more details see Pat Hillier and Nora Slatkin, "U.S. Ground Forces: Design and Cost Alternatives for NATO and Non-NATO Contingencies," Congressional Budget Office, 1980, especially Figure 24.

Prepositioned equipment for reinforcing U.S. divisions is concentrated in a cluster of facilities in West Germany. Currently, there are POMCUS (prepositioned overseas materiel configured to unit sets) depots for four division sets, with two additional undergoing completion.[60] Moreover, the central region's lifeline from the continental United States depends on the freedom to operate efficiently at a handful of vulnerable air and sea points of debarkation on the European continent.

Crisis Manipulation

If the Warsaw Pact foolishly chooses to conduct the kind of war NATO is best prepared to cope with, the Alliance's chances of achieving stalemate are good. Such a war is conveniently founded on the canonical ten- to fourteen-day mobilization scenario, in which NATO detects a Warsaw Pact mobilization four days after its start and responds with ten days of its own mobilization before the Warsaw Pact commences an offensive. But catching NATO off balance is essential to Soviet planning objectives. Even under circumstances where political desperation could propel the USSR to war, Soviet planners would seek to avoid initiating conflict at the peak of the crisis, when NATO might be partially mobilized and, thus, more survivable. Rather, Soviet decision makers might commence hostilities only after the crisis was defused, or perhaps even before it reached a peak. One need only recall General Ivanov's admonition about exploiting the initial period of war to appreciate the Soviet-perceived necessity to obtain decisive results before NATO completes its mobilization. Allowing mobilization to occur creates enormous targeting uncertainties for Soviet planners. Conversely, a dilatory NATO response to Warsaw Pact mobilization, which NATO might reason would reassure possibly desperate Soviet decision makers, could foster strong incentives for Soviet decision makers to substitute military for diplomatic action, especially before NATO's inviting vulnerabilities vanish.[61] NATO's weaknesses in this regard are nothing new; what is new is a set of emerging attack options that could dangerously aggravate European crisis stability.

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[60] For details on POMCUS, see *Department of Defense Appropriations for FY 85,* Hearings before a Subcommittee of the Committee on Appropriations, House of Representatives, 98th Cong., 2d sess. (USGPO, 1984), pp. 119-40.

[61] The best treatment of the crisis stability implications of acts of political desperation is found in Richard K. Betts, *Surprise Attack: Lessons for Defense Planning* (Washington, D.C.: The Brookings Institution, 1982), pp. 153-188. For a brief discussion of the crisis period, see Christopher N. Donnelly, "Soviet Operational Concepts in the 1980s," in *Strengthening Conventional Deterrence in Europe: Proposals for the 1980s* (New York: St. Martin's Press, 1983), p. 113.

Exemplary Nuclear Attack Option

Even though conventional war variants have greater plausibility (not to mention increasingly robust capabilities), there is danger in ignoring a Soviet attack option that involves nuclear first use. Logic alone suggests that a Soviet decision maker, willing to risk war at all, might be willing to accept the consequences of first use of nuclear weapons — especially if the consequences included attainment of all the Warsaw Pact's attack objectives with a minimum expenditure of attack resources. Moreover, the emerging force of short-range ballistic missiles deployed with Soviet ground units in East Germany and Czechoslovakia alone appears increasingly capable of supporting such an attack strategy. This capability derives from increases in missile range and launcher numbers, and, most important, from dramatic improvements in missile accuracy.

Before the introduction of the new generation of ground force missiles (SS-21, SS-22, and SS-23), Soviet planners could only contemplate massive strikes to achieve their attack objectives in the central region. Figure 2 illustrates the influence of improving missile accuracy on the size (number of strikes and total nuclear yield) of an attack. Most NATO targets are soft; that is, they are less than ten pounds per square inch (PSI) in hardness. As the figure demonstrates, the inaccuracy of Frog, Scud, and Scaleboard missiles meant either the expenditure of several missiles per target if 10-kt warheads were desired or, more likely, a major increase in warhead yields. By contrast, highly accurate SS-21s, SS-22s, and SS-23s, could effectively destroy even much harder targets in a single strike using 10-kt warheads. And for the majority of soft targets, subkiloton yields would be sufficient.

Quantitative increases in missile launchers and improvements in short-range missile coverage (especially as a result of the stationing of the SS-22 in Eastern Europe) suggest that Soviet missiles in Eastern Europe will be able to undertake a substantial portion of the pre-emptive strikes previously the exclusive domain of Soviet strategic nuclear forces based in the USSR.[62] Although the strategic nuclear forces would still be needed to accomplish the requisite number of strikes and to deal with the few targets located beyond the range of operational-tactical missiles — especially if NATO manages to mobilize before a Warsaw Pact decision to strike — it is illuminating for planners to consider precisely what role missiles in Eastern Europe could play in a pre-emptive nuclear attack at the outset of war.

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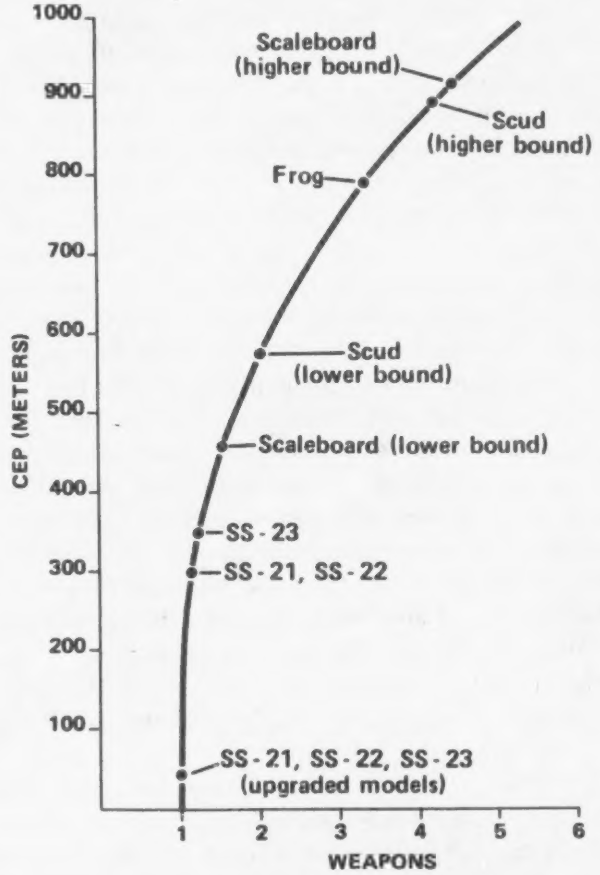
[62] Launcher increases stem from expansion of Scud/SS-23 brigades (twelve to eighteen launchers) and the addition of SS-22 brigades to Soviet ground forces stationed in Eastern Europe. See *Soviet Military Power 1985*, in n. 15, p. 38.

Figure 2
Number of 10-KT Weapons per 100 × 100 Meter Target to Achieve a Kill Probability of One Assuming a Weapon Reliability of One



SOURCES: "The Effectiveness of United States Military Aid to Israel (ISMILAID)," vol. 1, declassified (U.S. Department of Defense, December 1974), p. IV 80; "Memorandum for the Verification Panel Working Groups, Subject: FBS and Other Non-Central Systems in SALT TWO," declassified (U.S. Department of State, October 1972), p. 23; Walter Andrews, "Allies' Weapons Said to be Inadequate to Threat of New Soviet Missile Power," *Washington Times*, November 1, 1984, p. 3; and "Missile Deployment Strains U.S.-European Alliance, Tass Claims," *Washington Times*, May 30, 1984, p. 6.

TABLE 1

CRITICAL NATO INSTALLATIONS IN THE CENTRAL REGION

Target Categories	*Number*	*Distance From Inter-German Border* 0-100	*Distance From Inter-German Border* >100
Theater Nuclear Weapons			
• Storage Sites • Dual-Capable Airfields • Missile Garrisons	80	15	65
Air Defenses			
• Major C^3 Headquarters • Sector Operations Centers • Control and Reporting Centers • Interceptor Airfields • Warning/Surveillance	45	5	40
Major C^3 Headquarters	9		9
Reinforcement			
• POMCUS Depots • Air and Sea Points of Debarkation	25		25

SOURCES: *Washington Post,* November 1, 1981; Stephen M. Meyer, "Soviet Theater Nuclear Forces, Part II: Capabilities and Implications," *Adelphi Papers,* No. 188 (London: IISS, 1983/84), p. 24; *The Military Balance* (London: IISS, 1983/84) pp. 9-10 and 25-42; and Dan Boyle, "C—The Essential Ingredient to Air Defense," *International Defense Review,* No. 6, 1978, pp. 860-64.

At a minimum, such an attack would have to deal with the critical NATO installations in the central region (see table 1) associated with the Warsaw Pact's fundamental attack objectives. These objectives include neutralizing NATO's nuclear option, its superior air capability, its command and control means, and its potential to reinforce. As noted in table 1, most targets (139 of 159) of principal concern to Soviet planners are located beyond 100 kilometers of the inter-German border and thus are candidates for attack by SS-23 or SS-22 missiles. By the turn of the decade, an expanded force of missiles in the Group of Soviet Forces, Germany (GSFG) (plus an SS-22 brigade in Czechoslovakia) plausibly might consist of seventy-six SS-21 launchers, 144 SS-23 launchers, and fifty-four SS-22 launchers. Beyond the 159 targets noted in table 1, a Soviet target planner would probably also employ ballistic missiles against NATO's SAM belts to insure the creation of penetration corridors for the air operation. (Such an expenditure might be unnecessary if missile attacks against sector operation centers succeed in denying NATO the means of controlling complex air defense operations.) As noted earlier, Hawk and Nike-Hercules SAM belts contain roughly eighty-three and forty-nine targets, respectively. Suppressing half (or sixty-six) of these targets would materially aid establishment of perhaps five penetration corridors. Overall, then, some 225 targets (of which sixty-two are within range of seventy-six SS-21 missiles and 163 are within range of 180 SS-23 and SS-22 missiles) constitute the maximum target set.

But would not a ballistic missile attack of this size create enormous collateral damage and destroy the very prize Soviet political authorities desire most — a relatively intact West European industry? Calculations of nuclear yields needed to meet expressed Soviet damage of objectives suggest otherwise.[63] If we assume a missile accuracy of fifty meters CEP (circular error probable), the highest yield needed is ten kt to destroy aircraft in shelters and to neutralize reinforcement operations at sea ports of debarkation.[64] Because they are large area targets, POMCUS depots and missile garrisons require five-kt yields. Small point targets, such as nuclear storage sites and command and control bunkers, require only 300 tons each. Roughly 70 percent of the entire target set can be effectively attacked with weapons of much less than a kiloton in nuclear yield. Indeed, even if we assume that NATO responded to warning of attack by dispersing its nuclear weapons, the execution of such an attack would still cripple the Alliance's ability to control air and ground forces and to reinforce the European continent. By mastering the air, the Warsaw Pact could then freely employ hundreds of aircraft to destroy remaining high-priority targets — principally, dispersed nuclear weapons. Such a nuclear attack, limited in weapon numbers and yields, would not be without immense escalatory risks; however, emerging Soviet military capabilities evaluated in the context of critical NATO vulnerabilities presage a different set of escalatory risks than is popularly perceived today.

Exemplary Nonnuclear Attack Options

Rather than primarily supporting a nuclear attack option, the emerging capabilities appear more pertinent to a major goal in the Soviet force development process: turning the *possibility* of a conventional-only contingency into a *probability*.[65] The potential contribution of highly accurate, nonnuclear missiles to winning the air campaign and effectively committing OMGs and airborne forces deep behind NATO lines appears formidable.

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[63] Soviet target planners state a 0.9 probability of kill (P_k) for hard targets and all elements of enemy nuclear forces. Area coverage is used for most soft targets. Damage objectives for area targets are stipulated in terms of percentage of target area covered by overpressure that produces light (neutralization), moderate (destruction), and heavy (annihilation) damage. Percentage of area covered for neutralization is 10 to 30 percent; for annihilation 50 to 70 percent is required. Presumably, destruction falls in between. For more details, see Lee, "Soviet Strategic Ballistic Missile Forces," pp. 31-32. Calculations of yield requirements were performed with the aid of the Defense Nuclear Agency's *Damage Prediction Rule,* VN-1, October 1982. These calculations are not meant to suggest the availability of sub-kiloton nuclear yields for current or projected Soviet short-range missiles; rather, they suggest the potential inherent in highly accurate delivery systems.

[64] CEP is the radius of a circle whose center is the weapon's aimpoint and whose radius is defined so that the probability of the weapon landing inside the circle is 50 percent.

Munitions designed with tailored effects are already being introduced into the Soviet missile force structure. Improved area munitions appear ideally suited to deal with air defense batteries and to handle and transport equipment at nuclear storage sites. A recent article in the Polish military literature notes the critical importance of "attacks by missile troops involving the use of cluster charges with conventional weapons."[66] Cluster munitions spread the available energy over a wide area by dividing the overall explosive weight into a number of smaller containers. Another approach is to use fuel-air explosives (FAEs), which disperse an aerosol that mixes with the air and then detonates by a burster charge. FAEs spread the energy uniformly over a large area and produce an explosive effect comparable to that of the smallest nuclear weapons.[67] The Soviet military in Afghanistan has reportedly used FAEs delivered by SU-17 fighter-bombers. They are said to create a crater thirty feet in diameter and eighteen feet in depth and to have a 400-meter radius of effect against personnel.[68]

Even relatively hard targets will not be immune to the effects of highly accurate conventional weapons. Although there is no evidence of Soviet deployment of kinetic-energy or shaped-charge penetrators for conventional applications, such specialized designs appear suited to airfield runways and hardened underground structures. U.S. work on kinetic-energy penetrators designed to explode beneath airfield runways suggests that three missiles could effectively disrupt a main runway or taxiway.[69] At the same time, U.S. research in the mid-1970s on heavy, shaped charges (roughly an 800-kilogram warhead with steel liner) demonstrated a penetration capability of ten meters of concrete.[70] Older, hardened structures in NATO, such as many air defense command and control bunkers and nuclear weapon storage igloos, would be vulnerable to such weapons; one Allied Tactical Operations Center in the Central Region is situated in an old bunker with one meter of concrete and steel and two meters of earth cover.[71] Survivability of even newer underground C^2 bunkers, with two meters of concrete and steel and about four to six meters of earth and rock cover, could be challenged within the coming decade by emerging Soviet conventional systems.[72]

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[65] This expression is found in Petersen and Hines, "Soviet Theater Strategy," pp. 706-707.

[66] Musial, "Air Operations in Modern Warfare."

[67] Jorma K. Miettinen, "The Effect of New Military Technology on Future Battlefield Tactics and the Structure of Armed Forces," in William Gutteridge and Trevor Taylor, *The Dangers of New Weapon Systems* (New York: St. Martin's Press, 1983), p. 60.

[68] Yossef Bodansky, "Soviets Use Afghanistan to Test 'Liquid Fire'," *Jane's Defence Weekly*, May 26, 1984, p. 819.

[69] Donald R. Cotter, "Potential Future Roles for Conventional and Nuclear Forces in Defense of Western Europe," in *Strengthening Conventional Deterrence in Europe: Proposals for the 1980's* (New York: St. Martin's Press, 1983), p. 238.

[70] Cecil I. Hudson, Jr. and Peter H. Haas, "New Technologies: The Prospects," in *Beyond Nuclear Deterrence*, edited by Johan J. Holst and Uwe Nerlich (New York: Crane, Russak & Co., Inc., 1977), p. 128.

How might such a force of conventional missiles support Soviet wartime strategy? Soviet military planners would likely see a force of 274 launchers (with perhaps three to four missiles per launcher) as primarily furnishing direct support to the air operation.[73] It is important to remember that the air operation is far more complex than some Western analysts have depicted; in addition to conventional ballistic missile attacks, it would feature the use of airborne, air-assault, and special-purpose troops coordinated with the massive employment of frontal and strategic aircraft. The effectiveness of Soviet frontal and strategic aircraft in executing the air operation without the assured-penetration support of ballistic missiles is at best problematic; performance analyses in this regard are highly sensitive to assumptions about aircraft attrition. But new short-range conventional missiles — without concern for active defense attrition — could help free aircraft from the mission of suppressing NATO's air defenses. Before the advent of highly accurate Soviet conventional missiles, Warsaw Pact planners were compelled to devote a high percentage of the air operation's first wave aircraft to NATO air-defense targets merely to open penetration corridors for follow-on waves of aircraft. If conventional missiles were able to perform this mission, aircraft could then attend to the primary mission of neutralizing NATO's nuclear weapons, command and control, and reinforcement potential. In the latter regard, disruptive missile attacks against NATO airfields could pin down aircraft temporarily, thereby greatly increasing their vulnerability to air attacks.

As one possible attack option, Soviet planners might suppress half (or sixty-six firing batteries) of the Hawk and Nike-Hercules air-defense belts in the Central Region by employing two missiles per battery to achieve the Soviet damage criterion for area targets called "neutralization" (i.e., 10 to 30 percent area coverage).[74] The first salvo could also include attacks against the ten interceptor airfields (with six missiles per airfield needed to cut the main runway and taxiway) and five Control and Reporting Centers (with two missiles each).[75] Disrupting airfield operations for a minimum of several hours would facilitate follow-up bombing missions by frontal and strategic aviation against pinned-down NATO aircraft. The overall attack would require the expenditure of 202 missiles. Given the assumed availability of 274 launchers, the differential could support the possible need to maintain perhaps 25 percent of the launchers on a nuclear withhold status, while follow-up aircraft missions could compensate for any missile reliability problems.[76]

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[71] Boyle, "The Essential Ingredient," pp. 862-863.

[72] Ibid., p. 862.

[73] How many reloads will be available is a matter of conjecture. The Frog tactical rocket reportedly had four rockets per launcher. Given the dramatic accuracy improvements for the new generation of short-range missiles, it seems safe to assume that new Soviet missiles will have at least four reloads per launcher. For information on the predecessor generation of missiles, see Donald R. Cotter, James H. Hansen, Kirk McConnel, "The Nuclear 'Balance' in Europe: Status, Trends, Implications," *USSI Report 83-1* (Washington, D.C.: United States Strategic Institute, 1983), pp. 44-45.

[74] See W. T. Lee, "Soviet Strategic Ballistic Missile Forces," for a discussion of Soviet-perceived targeting factors and damage objectives. Weapon effectiveness calculations for the conventional attack options are based on D. H. Gloeckner, *Conventional Threat Assessment Methodology,* Pacific-Sierra

Alternatively, should NATO decision makers prove dilatory in outloading and dispersing nuclear weapons, a Soviet planner might choose to expend a portion of the initial salvo on high-priority nuclear storage sites, missile garrisons, and quick-reaction alert sites supporting Pershing II and GLCM (two missiles each against perhaps twenty-five targets), as well as the ten airfields in the Central Region supporting dual-capable aircraft (six missiles each). This portion of the attack would require the expenditure of 110 missiles, leaving 164 to suppress NATO's air defenses. The purpose of the attack against the nuclear target set would be simply to disrupt and delay an already cumbersome dispersal process, which depends heavily on the availability of extremely vulnerable handling equipment and transport vehicles. Delaying outloading by several hours increases the probability that penetrating aircraft will succeed in destroying these important targets before they disperse to seek cover. Subsequent missile salvos could then be employed to interrupt NATO's capability to generate aircraft sorties by cratering runways and destroying maintenance and munitions stores and to support OMG and airborne penetrations deep behind NATO's forward lines. The success of the OMG depends critically on the achievement of Warsaw Pact air superiority.

Alternatively, Soviet planners might choose to employ chemical weapons against nuclear weapon storage sites, airfields, and C^2 installations lacking chemical protection. More precise delivery systems enhance the selective employment of chemical weapons in coordination with the movement of Warsaw Pact ground forces. But improved delivery accuracies will not compensate for unpredictable meteorological condi-

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Research Corporation, PSR Report 902, July 1979. An accuracy of fifty meters CEP is assumed for all calculations.

[75] This calculation is based on the expectation that Soviet kinetic energy penetrators in the late 1980s will possess roughly equivalent effectiveness to currently available technology reflected in the Martin-Marietta CAM-40. Three CAM-40 missiles would be required for each runway and taxiway. For further details see Cotter, "Defense of Western Europe," pp. 238-40.

[76] The prior generation of operational-tactical ballistic missiles (Scud and Scaleboard) had a 0.75 reliability assigned to it, according to the International Institute of Strategic Studies, *The Military Balance* (London: IISS, 1981-82), p. 128. A modest improvement for the new generation of missiles would seem a safe assumption.

tions. Nonetheless, precise missile-delivered chemical attacks on just a few rear-area targets in NATO would produce devastating military effects. The deleterious consequences for NATO air operations are well known. Less familiar are the effects of chemical attacks on NATO reinforcement. According to recent congressional testimony, chemical attacks on POMCUS sites alone would create delays in reinforcement of at least several days and require "most of Europe's decontamination units." Moreover, the rapid supply of incoming units to Europe would undergo serious disruption because POMCUS sites depend heavily on local civilians "who may not have enough equipment and be well trained for operations in chemical conditions."[77] Even periodic missile strikes employing fuel-air explosives would seriously complicate finely tuned reinforcement procedures.

NATO planners are now compelled to consider what difference 274 missile launchers (for example), capable of delivering perhaps a thousand highly accurate conventional missiles, will make in calculating the conventional balance of forces. And these launcher and missile numbers only account for the front formed out of GSFG (plus one SS-22 brigade in Czechoslovakia). They do *not* include missile launchers organic to follow-on divisions and armies of the second operational and strategic echelons, nor to non-Soviet Warsaw Pact missile units. The important point, however, is that conventional ballistic missiles represent a brand-new factor; unlike high-performance Soviet aircraft, against which NATO is investing heavily in modernized air defenses, ballistic missiles are currently assured of penetrating to their targets, save for faulty missile performance. Successful suppression of selected portions of NATO's air defenses by conventional ballistic missiles would enable Soviet aircraft to conduct interdiction strikes in NATO's rear area with greatly reduced attrition.

In the final analysis, new Soviet short-range missiles challenge NATO's ability to deter through conventional denial. At least two recent studies of the NATO-Warsaw Pact air campaign question the extent of Soviet confidence in the success of their air operations.[78] But neither study considers the emerging contribution of Soviet short-range ballistic missiles. One, for example, concludes that *if* NATO air defenses were not severely degraded, *if* runway repair and aircraft dispersal could prevent extensive damage to NATO air bases, and *if* NATO interceptors and surface-to-air missiles could impose an exchange ratio of at least 2:1, then NATO might possess the capability to defeat the Warsaw Pact air campaign. Moreover,

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[77] *Department of Defense Appropriations for FY 85*, see n. 60, p. 129.

[78] Epstein, *Measuring Military Power;* and Lt. Col. D. J. Alberts, "Deterrence in the 1980s: Part II: The Role of Conventional Air Power," *Adelphi Papers*, No. 193 (London: IISS, 1984).

if NATO air forces could survive the air operation and sustain sortie generation, they could seriously damage the Warsaw Pact ground offensive.[79]

Without the contribution of new short-range missiles, a cautious Soviet war planner would probably not disagree. That reason alone furnishes sufficient impetus for the Soviet Union's significant investment in dual-capable ballistic missiles. Soviet planners no doubt recognize that the success of the U.S. Army's AirLand Battle doctrine and SHAPE's Follow-On Forces Attack strategy (just as their own OMG concept) rests on achieving air superiority. In the context of the air operation, especially under circumstances where tactical surprise is achieved, conventional ballistic missiles can turn doubt into confidence. Indeed, NATO planners have recognized the operational (if not political) value of attacking Warsaw Pact airfields in the first minutes of a war with conventionally armed ballistic missiles.[80] But for reasons of cost (creation of a new force structure equipped with expensive missiles) and adverse policy ramifications (a defensive alliance embarking on what many see as a fundamentally offensive course), NATO is unlikely to field conventional ballistic missiles for the counter-air mission.

No such inhibitions circumscribe Soviet conventional missile deployments. The Warsaw Pact force structure for short-range missiles has been in place for twenty-five years. And the advent of a conventional means to inflict decisive blows throughout the depth of NATO's defense is thoroughly consistent with the historical Soviet offensive style of warfare.

Final Observations

While there is room for argument over precisely where the Soviet Union stands today in its unfolding process of military force development, the direction and contour seem clear. Advanced military technologies — such as those furnishing dramatic improvements in accuracy and terminal effectiveness for new Soviet missiles in Eastern Europe — are being deployed in quantities sufficient to influence the refinement of Soviet force employment concepts meant to exploit the adversary's most conspicuous vulnerabilities. The role of the conventional ballistic missile in supporting the execution of the Warsaw Pact air operation perhaps best illustrates this interrelationship.

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[79] Ibid., p. 30.

[80] *Strengthening Conventional Deterrence in Europe: A Program for the 1980s* (Boulder and London: Westview Press, 1985), pp. 49-66.

New technologies and operational concepts, in turn, prompt changes in force structure. For example, the reorganization of Soviet air forces, together with improvements in ground force missile readiness, facilitates a more rapid transition from peace to war. Soviet military planners depend on surprise to achieve their wartime objectives; against a fully prepared NATO (nuclear weapons dispersed and reinforcement completed), Soviet planners cannot be confident of victory. They readily admit to worrisome shortcomings in command and control flexibility, in acquiring dispersed forces, and in sustaining support of increasingly complex aircraft technology.[81] But such operational weaknesses only reinforce the Soviet need to achieve decisive results in an initial pre-emptive air operation. In this regard, the contribution of highly accurate dual-capable missiles to the attack of unprotected and partially dispersed NATO targets could substantially improve Soviet confidence in exploiting the initial period of war.

NATO should immediately consider suitable hedges against this emerging threat. Several possible countermeasures — suppressive fire against Soviet missile launchers and improved dispersal of NATO's tactical nuclear weapons and aircraft — are worthy of study.[82] Unfortunately, some of these could heighten the risks of war during crises for the same reasons that Soviet missiles do. Offensive solutions like suppressive fire create strong hair-trigger incentives for pre-emptive attack, while defensive hedges such as dispersal succeed only if political leaders believe warning signals and react decisively. But history suggests leaders are reluctant to react for fear of provoking attack. NATO's fear of provoking Soviet pre-emption could inhibit such precautionary measures and create still stronger Soviet incentives to pre-empt, even in purely defensive situations.[83]

By comparison, tactical ballistic missile defenses of the non-nuclear variety are more consistent with the historic premise that NATO is a purely defensive military alliance. And because missile defenses are able to cope with the tension between military response and provocation, they could stabilize otherwise explosive crisis environments. Most important, even if NATO leaders failed to react to warning and the Warsaw

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[81] For a useful exposition of Soviet weaknesses in supporting increasingly complex aircraft, see Epstein, *Measuring Military Power*, pp. 43-130.

[82] Other relatively inexpensive measures pertaining only to aircraft survivability include the construction of additional take-off and landing strips and the provision of improved runway repair capabilities at NATO air bases.

[83] In the context of the Stockholm talks on confidence- and security-building measures, consideration should be given to procedures for notification of out-of-garrison activity specifically related to short-range ballistic missile units. At the same time, we should remember the weaknesses of such measures, especially during deep crises. See, for example, Kevin N. Lewis and Mark A. Lorell, "Confidence-Building Measures and Crisis Resolution: Historical Perspectives," ORBIS, Summer 1984, pp. 281-306.

Pact successfully surprised the Alliance, ballistic-missile defenses could best contend with the consequences of surprise.

NATO's near-term response to its dilemma could consist of either modifications to existing hardware (for example, to provide the Patriot air-defense system with a self-defense capability) or a new anti-tactical ballistic missile system designed in an incremental building-block approach. A modest upgrade of the Patriot would not furnish much area protection, but would help deter conventional war by complicating the delicate timing involved in the Soviet coordination of first-wave conventional missile and follow-up air attacks. Though modest in capability and cost, the dual-mode Patriot could very well deny the Warsaw Pact a decisive edge in a pre-emptive conventional air operation.[84]

Alternatively, the use of a building-block approach for a new ATBM system offers attractive opportunities for European cooperation with the United States. Although the flight times for Soviet short-range ballistic missiles are appreciably shorter than for intercontinental ballistic missiles, their velocities are much lower, making them especially susceptible to an ATBM system of ground-based interceptors and airborne sensors. The first phase, which the United States might chiefly finance, could consist of only ground-based components: high-acceleration interceptors and supporting radars. European firms might usefully contribute to incremental system growth through work on either an airborne or space-based early-warning sensor. Such an addition to the ground-based components would substantially broaden coverage against a range of Soviet nuclear and nonnuclear attack options.

No terminal point exists in the Soviet force development process; evolutionary improvements in technology, operational concepts, and force structure will further combine to furnish the Soviet political leadership with a broader range of military options to buttress coercive diplomatic needs in peacetime and to produce decisive results in wartime. Arguably, while NATO's threat of escalation may represent the least satisfactory expedient for coping with the coercive potential of growing Warsaw Pact military force, the threat probably will succeed in deterring the outbreak of major hostilities. Nonetheless, prudence alone mandates preparing appropriate defensive hedges against the uncertainties of crises and the possible failure of deterrence. The issue of sufficiency invariably is contentious — as it ought to be. But what ought to be far less fractious an issue is the direction of the Soviet force development process and its consequences if left unattended.

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[84] NATO could choose to "size" its requirements beyond upgrading the planned Patriot European deployment along the following lines: (1) decide on which military complexes require protection in order to achieve NATO's minimum set of military objectives; (2) determine the temporal requirements for defending these military complexes. Some small number of facilities (e.g., major C^3 headquarters) might require prolonged defense while others (such as nuclear storage sites and missile garrisons) need be defended only until units have departed fixed facilities for safer havens; and (3) deploy only enough launchers and missiles to raise Soviet uncertainty about the success of the conventional air operation. Soviet efforts to overwhelm a small number of defended high-value targets by concentrating an attack might succeed, but only at the expense of sparing other critical targets from the initial missile attack. By so complicating the air operation's planning, such a limited-capability system could shift the burden of escalation to Soviet decision makers, where it belongs.

There is bitter irony in the Soviet coupling of accurate conventional missiles to a truly offensive war strategy: while the threshold between conventional and nuclear war may seemingly be raised, the vital threshold between peace and war may correspondingly be lowered. Under these circumstances, the Alliance can ill-afford to be reticent in dealing with its most inviting vulnerabilities.

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MEMO FOR: SDI Supporters & Critics
RECOMMENDATION: Try Collective Security
FROM: R. James Woolsey

R. James Woolsey is a member of the Packard Presidential Blue Ribbon Commission on Defense Management. The former Under Secretary of the Navy is currently a partner in a Washington law firm and is Counsel to Georgetown University's Center for Strategic and International Studies.

The debate over the Strategic Defense Initiative—Star Wars, if you like—has deteriorated into a national and indeed an Alliance-wide version of a grouchy old married couple's favorite spat—their pastime on evenings when there's nothing on television. The first time an outsider witnesses it, such a spat may seem mildly interesting, if only for its vigor—in spite of the well-worn and oft-stated positions of the adversaries. But if such an observer, through boredom or otherwise, should chance to offer a suggestion—a compromise perhaps—he runs the severe risk that both the husband and wife will turn angrily on him. To tell the truth, they are really very comfortable with their spat. Indeed, if you must know, they often have it even on evenings when there *is* something on television. It's their favorite thing to do.

Such a couple may, indeed should, be left alone to their pursuit of happiness. But—in spite of the hazards of intervention—the more hot-tempered critics of, and the more exotic dreamers about, strategic defense deserve no such deference. Their current spat is about the number of hypothetical satellites carrying boost-phase interceptors that can, or should, dance on the head of a constellation. In general, this is all getting tedious; it has created the impression that only physicists and metaphysicians have a role in the SDI debate.

In deciding how to deal with the SDI issues, the rest of us would be well advised to start from the proposition, well explicated by Albert Wohlstetter in the current issue of *Foreign Affairs*, that the Soviets would far prefer to advance their cause with the least possible risk to themselves. Thus it is far less likely that we will be hit by a bolt-from-the-blue attack by zillions of Soviet ICBMs than by militarily-backed political blackmail, terrorism, chemical warfare, conventional attack against a NATO flank, or—if nuclear weapons should be used—limited regional use of a few such weapons against military targets. Being able to defeat, and hence to deter, these sorts of threats should have a high priority. It is important, then, that parts of the technology now being investigated for the Strategic Defense Initiative could be quite relevant to blocking some of these Soviet moves.

For example, in Europe today the Soviets are deploying a new generation of tactical ballistic missiles with ranges up to around 500 miles—all of shorter range than the famous SS-20. They can be equipped not only with nuclear but also with chemical warheads; they also either have, or in the near future will have, the accuracy to carry effective sophisticated conventional warheads—e.g., those designed to destroy runways. Thus, these tactical ballistic missiles are an important Soviet trump card in any crisis in Europe. Within minutes they can strike NATO's airfields, depots, and command and control centers even in a *non*-nuclear war, and they make possible an effective end-run around NATO's recent hard-won and long-overdue improvements in air defenses.

The Soviets are quite far along in their own work on defense against tactical ballistic missiles—their new SA-X-12 defensive missile can be so used. Tests of defensive systems against tactical ballistic missiles, if conducted properly, do not violate the ABM treaty; the latter deals explicitly with systems tested against *strategic* missiles.

This year the White House, the Department of State, and the Secretary of Defense in his *Annual Report* have all stressed that defense against non-nuclear tactical ballistic missiles is an important aspect of strategic defense. But virtually no funds have been committed to such a program. It would seem that—at a time when Western European and Congressional support for some of the more ambitious goals and exotic approaches of SDI is reluctant, at best—there would be real utility in using the SDI program to solve an important and immediate military problem for the Alliance.

European fears about SDI leading to a Fortress America could be assuaged if the US and its Allies were to make a serious effort, together, to develop tactical ballistic missile defenses for NATO. Politically, it would seem useful to try to bring under the SDI umbrella those Members of Congress and Europeans who would favor enhancing NATO's conventional defenses and who might favor defensive deployments consistent with the current provisions of the ABM treaty, but who remain skeptical about space-based leak-proof defenses of population.

An effort to develop antitactical ballistic missile defense would not make it necessary for those who are particularly keen for, and hopeful about, SDI's more ambitious and long-range objectives to renounce such hopes. Indeed, some of the same technology that would be relevant to an effective defense against the longer-range Soviet tactical ballistic missiles, particularly the SS-23s, could also be applicable in a more ambitious form to defend against SLBMs and ICBMs—e.g., airborne optical sensors and fast kinetic-energy interceptors.

Cohesion within NATO and bipartisan support for the defense program in Congress are essential for either successful modernization of our military forces or successful arms negotiations with the Soviets. Why can't those SDI supporters and critics who at least agree on this, and on the importance of improving NATO's conventional defenses, also agree on making *antitactical* ballistic missile defense an important part of the SDI program?

These groups may still disagree about the likely cost and feasibility, even the desirability, of more ambitious SDI deployments, but there is time enough for research, arms negotiations, or both to resolve those disputes.

In the meantime, SDI supporters need to ask themselves whether it would really compromise their ideals to use their program to deal with a serious threat to NATO that provides somewhat less technical challenge than does building a perfect space-based defense. And critics need to examine whether they are so opposed to SDI that they can't even stand to have it associated with an objective that most of them support strongly—improving NATO's conventional defenses. Both sides in the debate now have an important choice to make—they can solve a real and immediate military problem, or they can join the spat. ■ ☆ ■

TESTIMONY OF
THOMAS DINE, EXECUTIVE DIRECTOR
DOUGLAS BLOOMFIELD, LEGISLATIVE DIRECTOR
AMERICAN ISRAEL PUBLIC AFFAIRS COMMITTEE (AIPAC)
BEFORE THE
SUBCOMMITTEE ON STRATEGIC AND THEATER NUCLEAR FORCES
SENATE ARMED SERVICES COMMITTEE
JANUARY 30, 1986

Mr. Chairman, the American Israel Public Affairs Committee appreciates the opportunity to submit testimony to the Armed Services Subcommittee on Strategic and Theater Nuclear Forces. The subject of this hearing, the threat of tactical ballistic missiles and the need to examine possible defenses against them, is of particular interest to those concerned about the supply of tactical missiles by the Soviet Union to its client-states in the Middle East. These missiles threaten American security interests and the security of our only reliable, consistent and democratic ally in that part of the world, Israel.

Israel's enemies are now being armed by the Soviet Union with a new generation of highly lethal surface-to-surface missiles, more accurate and more deadly than any previously available weapons. Unfortunately, there are no comparable defensive systems available today that Israel could obtain to protect its vulnerable cities from bombardment.

To further examine the increasing problems that these missiles pose for the security of Israel, we have prepared a detailed paper for submission to the committee on "The Threat to Israel from Tactical Ballistic Missiles." I request that it be included in the record of the Committee's proceedings on this subject.

The Threat to Israel from Tactical Ballistic Missiles

W. Seth Carus*

Circumstances have made Israel particularly sensitive to the dangers posed by tactical ballistic missiles. For more than two decades, Israel's leaders have recognized that their country could be attacked by hostile states using short range surface-to-surface missiles. In the early 1960s, Egypt launched a massive effort to design and build its own force of short and medium range ballistic missiles. Although this program failed, the Soviet Union stepped into the breach and supplied Arab armies with FROG and SCUD missiles. At least thirty of these missiles were fired at Israeli targets during the 1973 Arab-Israeli War. The Syrians fired about twenty-five FROG-7 missiles at sites in Israel, mainly against Ramat David and other Israeli air bases. The Egyptians reportedly fired a small number of FROGs and at least three SCUD-B missiles at Israeli targets.

Arab armies currently possess more than 200 Soviet-supplied SCUD-B, FROG-7, and SS-21 launchers, probably supported by an inventory of at least 1,000 surface-to-surface missiles. These missiles are now treated as conventional weapons and are routinely used in conflicts with other countries. Iraq has fired a substantial number of FROG and SCUD missiles against Iran, and Iran has recently reciprocated using missiles provided by Libya.

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* The author is the senior military analyst for the American Israel Public Affairs Committee.

The Threat of Surface-to-Surface Missiles

Based on their experience in 1973, Israeli military planners came to believe that the FROG and SCUD missiles did not endanger the security of their country. Although it was recognized that cities were vulnerable to attacks by such weapons, it was believed that the threat of retaliatory strikes would deter attacks on civilian targets and that the missile launchers could be destroyed before serious damage was inflicted. Also, with the warheads then available to the Arabs, damage to civilian targets would be limited. At the same time, it was recognized that the FROG and SCUD missiles could not destroy hardened military targets. Thus, the missiles could temporarily prevent Israeli aircraft from landing at an air strip, but could not destroy an air base.

The threat from tactical ballistic missiles is far greater today. The decision of the Soviet Union in 1983 to supply Syria with the new SS-21 surface-to-surface missile is largely responsible for the heightened awareness in Israel of the potential threat posed by such weapons. Unlike the FROG and the SCUD, the SS-21 has the range, accuracy, and lethality to destroy hardened targets deep inside Israel.

The SS-21 is part of a new generation of Soviet-built surface-to-surface missiles have appeared in the past few years that correct the weaknesses of the weapons they replaced. These new weapons, the Soviet SS-21, SS-22, and SS-23 family of missiles, are extremely accurate and can be armed with cluster munitions. Thus, unlike the SCUD-B and FROG-7 systems, they pose a considerable threat to all but the most mobile or best protected military targets.

Normally, the SS-21 is considered a tactical weapon, because of its relatively short range, but because of Israel's small size, strategically important targets are within close proximity to enemy ground forces. This lack of strategic depth transforms short-range surface-to-surface missiles, like the SS-21, into strategic weapons able to strike targets throughout Israel, including air bases, command posts, equipment storage depots, surface-to-air missile batteries, radars, and other vital facilities.

Syria now has as many as 24 SS-21 missiles, and additional numbers are reported to have gone to Iraq. The 120 kilometer range of the SS-21 allows it to be used against targets that the FROG-7 cannot reach. When fired from Syria, the SS-21 can reach targets throughout northern Israel, including one of Israel's main air bases, Ramat David. If deployed in Jordan, however, all of Israel would be brought within range.

Currently, there are only a few SS-21 missiles in the Middle East, but even this small quantity is of concern to Israeli military planners. Past experience indicates that the Soviet Union will provide more of these weapons as time passes and Arab armies want to replace their existing FROG-7s. Similarly, it is highly probable that SS-23 missiles will begin to appear in the region before the end of the decade. Thus, by 1990 Israel will be faced by Arab arsenals containing large numbers of highly accurate surface-to-surface missiles armed with sophisticated warheads.

It is likely that in the 1990s Arab armies will acquire tactical ballistic missiles from other sources. Brazil is looking into building a medium range ballistic missile, with the development funded by foreign countries. Past experience indicates that Arab countries, Iraq or Libya, would be the likely sponsors and beneficiaries of such a project. Similarly, European countries are developing sophisticated weapons payloads that could be added to a tactical ballistic missile, providing further improvements in accuracy and lethality.

The increasing emphasis given to chemical weapons by Arab countries makes even older missiles more of a problem for Israel. Iraq has used chemical weapons in battle, and Syria is known to have an extensive and sophisticated chemical warfare capability. Ballistic missiles armed with chemical warheads pose an obvious threat to Israeli population centers, but they also could effectively suppress Israeli air bases and other military installations and significantly reduce Israel's retaliatory capabilities.

The Lack of an Effective Response to the SS-21

Israel can defend against surface-to-surface missiles only by destroying their launchers before surface-to-surface missiles are fired. This was not a serious weakness when the missiles were inaccurate. If inaccurate missiles were used against civilian targets, Israel's air force could launch counter strikes in retaliation, and the missiles would probably inflict only minimal damage if targeted against Israeli military installations.

The arrival of the SS-21 has made it impossible to ignore the threat of surface-to-surface missiles. As the Arab inventory of SS-21 missiles grows, Israel may find that it can no longer tolerate the damage that could be inflicted by a strike from tactical ballistic missiles. Missile strikes at the outset of a war could inflict sufficient damage to vital Israeli installations to seriously weaken Israel's military capabilities during the critical first hours of a war, even if Israel knew in advance that an attack was about to take place.

For example, a successful missile attack against airfields would significantly reduce the number of aircraft that the Israeli air force could put into the air. After such a strike, Israel's ability to defend its borders during the critical opening hours of a conflict would be significantly weakened, since ground units deployed on the borders in peacetime may well depend on support from the air force until reserves are mobilized. Under such conditions, Israel also would have fewer aircraft available to send on strike missions against surface-to-surface missile launchers, and could not count on preventing follow-on missile attacks. Accordingly, it appears that Israel can do little to stop Arab missiles from hitting and damaging air bases and other vital installations.

As a result, the Israeli military will be increasingly forced to identify and attack launchers before missiles are fired. If there is a danger of an Arab attack, Israel will be forced to strike first, because it will not be able to take the risks of waiting and absorbing an Arab attack. Although such a strategy will make the Middle East a more dangerous place, the absence of a viable defense against tactical ballistic missiles will leave Israel with no alternative.

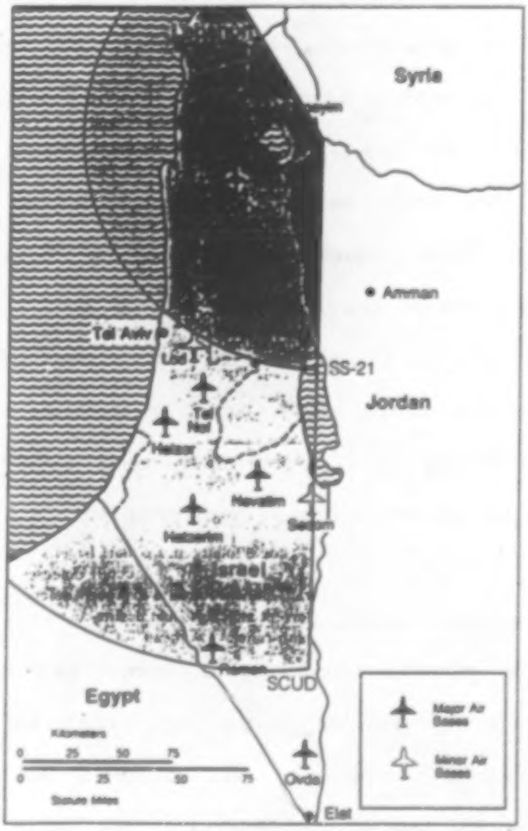
There appears to be a growing awareness in Israel that the enormous inventory of short range ballistic missiles available to Arab armies will make it difficult or impossible for Israel to locate and destroy all the launchers. Hence, even under ideal circumstances, a large number of missiles will strike military and civilian targets throughout Israel. As the Arabs acquire larger quantities of accurate missiles like the SS-21, and as Israel's ability to deter missile attacks diminishes, Arab armies will be able to employ their older and less accurate FROGs and SCUDs against urban centers. As a result, tactical ballistic missiles directed against cities potentially could easily result in 5,000 dead and wounded Israeli civilians in a future Arab-Israeli War.

Defending Against the Tactical Ballistic Missile

The lack of an effective defense against tactical ballistic missiles poses serious problems for Israel. For the moment, Israel might be able to tolerate such a weakness without jeopardizing its security. As additional new generation tactical ballistic missiles are deployed in the region the inability to defend against surface-to-surface missiles will become a serious one.

A defense against tactical ballistic missiles would significantly enhance Israel's security. Although the Israeli military could take steps to develop defenses on its own, the development of such systems is too great a challenge to be handled by one small country. Clearly, any progress made in the United States to develop answers to the dangers posed by tactical ballistic missiles could have a fundamental affect on Israel's future security. And, it should be stressed, the benefits resulting from the development of such a system would be shared by other American allies who also find that they must deal with the growing threat of tactical ballistic missiles.

The Missile Threat from Syria


Syria
Amman
Tel Aviv
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SS-21
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Tel Nof
Hatzor
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Sedom
Hatzerim
Israel
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SCUD
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Kilometers
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Statute Miles
Ovda
Elat
Major Air Bases
Minor Air Bases

[Additional inserts submitted for the hearing record by Senator Dan Quayle.]

Ballistic Missile Defenses Would Reduce the Danger of War in Europe

by David Blair and Brian Chow
Pan Heuristics
February 7, 1986

With no defenses against ballistic missiles, NATO's general purpose forces (defined to include tanks, planes, surface-to-air missiles, artillery, infantry, and battlefield nuclear weapons) are very vulnerable to a surprise Soviet attack. A ballistic missile strike could destroy the small number of bases where NATO general purpose forces are located--practically eliminating our capability to resist a Soviet invasion of Western Europe. Our vulnerability has worsened over the last decade because the Soviets have deployed many new, accurate theater ballistic missiles. So, the world without ballistic missile defenses (BMD) is very unstable because the Soviets have a lot to gain militarily by launching a surprise attack.

A BMD could protect NATO's general purpose forces, which are now sitting ducks for Soviet ballistic missiles. NATO's position would be greatly improved even by deploying a far-from-perfect BMD system that would save only 20% to 50% of our general purpose forces.

Soviet general purpose forces are much less vulnerable to ballistic missiles because they are already divided among many more bases. They could be quickly hidden and spread out into the countryside shortly before a planned Soviet surprise attack. BMD systems deployed by both sides would be very stabilizing because they would improve the position of the defender (NATO) much more than that of the attacker (the Soviets). No wonder the Soviets strenuously oppose BMD; it would greatly reduce their capability to blackmail Europe with threats of attack. Even without actually attacking, the Soviets could gain much politically by having the capability to defeat

NATO.

Some opponents of BMD systems argue that NATO could deter a Soviet attack on Western Europe's military forces by threatening to destroy Soviet cities in retaliation. Yet one major advantage the Soviets gain from their new, accurate ballistic missiles is that they can destroy military targets using small warheads (either nuclear or conventional) that would kill very few civilians in the process. NATO cannot credibly threaten to retaliate for such an attack by killing millions of Soviets--especially when carrying out these threats would lead to the deaths of millions of NATO civilians. Would NATO (knowing that Hamburg, London and Washington would be destroyed in turn) decide to destroy Moscow, Kiev, or Leningrad because the Soviets destroyed NATO air or Army bases? We cannot rely on such MAD threats to deter attacks on military forces; the only real deterrent to this real threat is to develop NATO's ability to protect enough general purpose forces that the Soviets will have little military reason to attack in the first place.

I. NATO's Undispersed General Purpose Forces Are Very Vulnerable

Three geo-political facts leave NATO asymmetrically vulnerable to a surprise attack:

(1) The small amount of land available in Western Europe compels NATO to concentrate its forces in a very few points where they are vulnerable to a ballistic missile attack.

(2) NATO reinforcements are very far away. Moreover, they have to pass through a small number of ports and airfields that are vulnerable to ballistic missiles.

A major consequence of (1) and (2) is that it takes NATO much longer than it does the Soviets to disperse general purpose forces out of peacetime bases (where they are very vulnerable to ballistic missile strikes) into spread-out positions in the countryside (where they would be much less vulnerable).

(3) The Soviets will almost certainly strike first. This will give them the advantage of tactical surprise. It is implausible that NATO could secretly plan and carry out a surprise attack against the Soviets.

Ballistic missiles are very effective against highly concentrated forces; for example, one Soviet low-yield nuclear warhead might destroy hundreds of NATO tanks while they are still in the garage where they are prepositioned awaiting reinforcements from America (POMCUS site). On the other hand, the Soviet armored forces are spread out among many more bases and can be moved out much more quickly than can NATO's. So the Soviet-surprise attacker could disperse many of his own conventional forces a few hours before the planned ballistic missile strike. A NATO retaliation against such already dispersed forces would not be very effective; one NATO warhead might kill only one Soviet tank (assuming that the tank could be located).

Traditionally, NATO counts on at least days of warning. But, we argue that the new, accurate ballistic missiles give the Soviets the capability to launch a devastating attack while giving NATO at most a few hours warning. Before the ballistic missile attack, the Soviets only need to disperse (in contrast to "mobilize") their forces--they need not mass their invasion forces into concentrated groups. The essential purpose is to spread out to preclude effective NATO retaliation. This strategy would reduce both the warning time given to NATO and the vulnerability of Soviet forces. Against a NATO decimated by the ballistic missile strike, the Soviet forces might not need to mass in large numbers at any time during the invasion of the West. Moreover, reinforcements located in the Western U.S.S.R. (whose movements are often counted on to give NATO warning) could be activated after the surprise ballistic missile attack (if they are needed at all).

In addition to the POMCUS sites, other NATO conventional forces are asymmetrically vulnerable. NATO air forces are located at a few Main Operating Bases (MOBs) and are very vulnerable to attack by a few ballistic missiles. The Soviets have an easier time maintaining their air capability when faced with a ballistic missile attack because they rely much more extensively on more dispersed and survivable surface-to-air missiles for air defense (rather than NATO's fighter aircraft) and on tactical ballistic missiles for strike missions (rather than attack planes). NATO ports and other facilities needed to bring reinforcements from the US and the UK are also very vulnerable to ballistic missile attack.

NATO could provide some defense of military forces with solely passive measures and could go to a higher state of alert. But, without a BMD, these measures are expensive and dubiously effective. An alert cannot be long sustained because alerted or dispersed forces lose their readiness to fight very quickly--machines break down and men tire. Going on alert is a measure best fitted for an attacker, who knows the time of the attack, rather than a defender who, must be prepared for an attack at all times. If NATO does not build a BMD, it is highly unlikely that NATO could take the expensive, time consuming, and probably non-sustainable steps needed to save our forces from a surprise attack.

This is true even if the attack is not "out of the blue." It could be launched in the middle of a crisis and NATO probably would receive some unavoidably ambiguous warning of Soviet attack, but this warning would almost certainly not be sufficient to allow us to disperse and protect many of our general purpose forces. Consider the following attack:

Six hours before they launch the surprise ballistic missile attack, the Soviets begin moving their tanks and troops out of their bases in Eastern Europe, dispersing them widely throughout the countryside. They are able to do this because their forces are already located on a large number of bases that can be emptied rapidly and because the needed troops are always at hand--not across the Atlantic. These dispersed forces are relatively safe from NATO retaliation. NATO would probably detect that something was up within a few hours, but would not be able to disperse its own forces sufficiently to save them.

After about six hours spent dispersing their general purpose forces, the Soviets launch their highly accurate theater ballistic missiles against a few hundred bases where the forces NATO needs to resist an invasion are concentrated. With only a few minutes warning, the Soviet ballistic missiles kill NATO infantry bases, air bases, air defenses, Pershing, cruise missile and other nuclear storage sites, and the garages where NATO tanks and artillery are stored (POMCUS sites). At the time of the attack, the POMCUS sites would still be full and the aircraft would at best be dispersed to dozens more airfields; without BMD, these aircraft would be destroyed by only dozens more missiles.

II. Recent Soviet Procurement of Theater Ballistic Missiles

The Soviets have invested heavily in accurate theater ballistic missiles (SS-20s, 21s, 22s, and 23s) over the past decade precisely to take advantage of the vulnerability of Western general purpose forces. These short and intermediate range weapons were not designed to hit US or European cities, the Soviets already had many warheads available which could do that. The newly procured missiles have given the Soviets a much-increased capability to threaten plausible attacks that could kill very few civilian by-standers while wiping out NATO's forces.

Another near-future threat will be the Soviet capability to destroy NATO's general purpose forces with an attack using purely non-nuclear ballistic missiles combined with a follow-on attack using airplanes. They will be able to use accurate, conventionally-armed missiles to close runways and suppress air defenses and then send in planes to kill NATO's planes that would be trapped on the ground. They could use the same tactic to open air corridors for attacking other military assets. Thus, the Soviets could disable NATO in a few hours without any use of nuclear weapons at all.

III. BMD Reduces the Incentives for Both Sides to Attack

The above argument shows that the world is very unstable without BMD because the Soviets have a lot to gain by launching a surprise ballistic missile attack on NATO's general purpose forces. How will the deployment of BMD by one or both sides affect "stability"?

With no BMD, NATO could be left with few surviving ground or air forces to resist the Soviet invasion of Western Europe while many more Soviet forces, especially ground forces, would survive a NATO retaliatory strike. A

NATO BMD, even one that protected only 20% to 50% of NATO general purpose forces, would greatly reduce the extreme advantage in the ratio of surviving forces that the Soviets would gain from such a surprise attack.

BMD protects undispersed general purpose forces. It serves as the defender's counter to the advantage the attacker gained from surprise. So it would improve NATO's position even if the Soviets also built one.

A world where both sides have a BMD is more stable than a world where neither side has one. The Soviet surprise attacker, who knows when and how the attack will take place, would have already hidden and dispersed many of his general purpose forces. Thus a ballistic missile retaliation will do him much less harm than a surprise ballistic missile attack will do to the defender.

This means that a BMD would do much more to improve the defender's post-attack situation than the attacker's. That is, when both sides deploy a BMD system, the net incentive to attack is reduced for both sides. A BMD is stabilizing even if both sides deploy one. (Of course, the Soviets can develop a BMD even if NATO does not. They have already started to do this through their SA-X-12s which have both air-defense and some BMD roles.)

IV. Contrast with the MAD model of stability

Some BMD critics argue that tactical nuclear weapons are NATO's ace in the hole. They argue that the Soviets have conventional superiority over NATO, but can be deterred from attacking by NATO threats to "escalate" to the use of nuclear weapons. They worry that a Soviet BMD would deny NATO the capability to escalate.

There is a great deal of delusion, wishful thinking, and irrationality in this argument. First, the fact that NATO abstains from building a BMD in no way implies that the Soviets would also be so abstemious. But, even if a verifiable agreement could be reached banning BMD systems in Europe, NATO should reject any such agreement because the lack of a BMD leaves NATO naked to Soviet attack; the net effect is greatly disadvantageous to NATO.

These escalation advocates are invariably very vague about exactly which targets NATO will hit with nuclear weapons if we choose to "escalate". The next time someone argues that NATO can counter a Soviet attack that is limited to hitting NATO military targets by resorting to escalation, ask for a few examples of the places he plans to aim NATO's nuclear weapons. There are two basic possibilities: (1) military targets and (2) people.

We have seen that ballistic missiles are much more effective at destroying the concentrated general purpose forces of the NATO defender than the dispersed forces of the Soviet attacker. So the use of ballistic missiles (whether nuclear or conventionally-armed) in Europe in fact gravely worsens NATO's military situation. So the escalation strategists must not seriously be planning to aim only at military targets.

That leaves Soviet cities. The doctrine of Mutual Assured Destruction (MAD) asserts that the world with no BMD is "stable." This assertion is based on the claim that Soviet attacks on NATO can be reliably deterred by NATO threats to retaliate by destroying tens or hundreds of millions of Soviet civilians--even if this would lead to the deaths of hundreds of millions of NATO civilians. If the Soviets believed such MAD threats, they would attack only if they could totally deny the US the capability to hit Soviet cities. Then the West would have to worry solely about Soviet attacks that could completely disarm the US strategic retaliatory force. Since we have survivable submarine ballistic missiles, MAD adherents conclude we have nothing to worry about.

But, is it really plausible that NATO would choose to destroy all our nations in response to a Soviet attack that killed very few civilians? Is the hope that the Soviets will believe such absurd threat a sufficient deterrent? The belief that NATO would and should respond so apocalyptically is central to the MAD argument thet the world is stable with no BMD. MAD is aptly named because it assumes suicidal irrationality on the part of NATO decision-makers.

We need to be serious about the real threats to NATO military forces. At a time when BMD is essential for deterrence of real Soviet attacks, our policy-makers cannot afford to be misled by MAD pontifications claiming that BMD would be destabilizing.

V. Summary: Five Major Conclusions

The above discussion is based on a model (see Appendix) we have developed to analyze the effects of BMD in the real world where the Soviets might, if NATO were vulnerable enough, attack NATO´s general purpose forces. This model shows (in contrast to the MAD model) that the world is very unstable without BMD because the Soviets have a strong incentive to attack NATO´s ground and air forces.

Deployments of BMD can be very stabilizing because they reduce the incentives for both sides to strike. This is true even for BMD systems much too small or otherwise not able to provide near-perfect protection of cities. There are five major conclusions:

1. NATO BMD deployments greatly reduce the Soviet incentive to attack

without significantly increasing any NATO incentives to attack the Soviets. Many critics fear that while a BMD would reduce the Soviet incentive to strike us, it might equally increase our own incentive to get in a first strike. This analysis shows that the reduction in Soviet attack incentive is much greater than the slight increase in NATO attack incentive. Thus BMD deployment by the West is stabilizing.

2. NATO deployments of BMD, even if matched by the Soviets, rapidly reduce the Soviet incentive to attack NATO's general purpose forces.

3. NATO's relative position (after the ballistic missile exchange) can be greatly improved even if we protect only some small portion (say 20-50 percent) of our critical general purpose forces. Such a far less-than-perfect BMD system is likely to be cost-effective.

4. Some people think that we would not need a BMD system if we could make our own offensive ballistic missiles less vulnerable and had more of them. But these offensive forces would not reduce the asymmetric vulnerability of NATO's general purpose forces. More offense is no substitute for a defense.

5. Perhaps the most ridiculous argument against a BMD is the claim that it would mean abandoning our allies or would reduce our conventional defense capability. In fact, BMD is essential if we are to maintain both our conventional and nuclear capabilities to defend Europe in the face of an increasing Soviet ballistic missile threat.

Appendix: A Model of the Effect of BMD on Stability in Europe

Suppose the Soviets launch a surprise ballistic missile strike against NATO's general purpose forces and NATO uses its surviving RVs to retaliate against whatever Soviet general purpose forces remain undispersed and vulnerable to ballistic missiles. The resulting Soviet advantage in surviving general purpose forces tells us the Soviet military incentive to launch the attack in the first place. Define the Soviet General Purpose Force Ratio ($GPFR_{sov}$) as the ratio of surviving Soviet general purpose forces to surviving NATO general purpose forces. All else being equal, the higher this ratio, the more incentive the Soviets have to start a war.

The general conclusion of our argument is that a BMD substitutes for dispersal as a way to protect general purpose forces. The defender, who cannot disperse his forces, can be helped a great deal by a BMD that reduces the advantage the attacker gains by surprise attack. Since the attacker has the advantage of surprise and is actually able to disperse many of his GPFs, a BMD improves the position of the attacker much less.

Look at an example that roughly represents the European situation in the 1990's (when a BMD can be deployed). The Soviets have some advantage in general purpose forces even if there is no ballistic missile attack. Assume that the Soviets have a total of 400 units of General Purpose Forces (GPFs)--each GPF is one point that, if undispersed, can be destroyed by a ballistic missile. Assume NATO has a total of 350 GPFs. So, before the ballistic missile attack, the Soviets have a slight 1.14 to 1 (400/350) advantage in general purpose forces.

Now (here's the crunch) let the Soviets launch a surprise ballistic missile attack against NATO GPFs. Because the Soviets are able to mobilize and disperse their GPFs in anticipation of the attack, they are able to save, say, 250 out of their total of 400 GPFs. NATO, with little warning, only manages to disperse 50 of its own GPFs before the Soviets launch their ballistic missile attack. This is the asymmetric vulnerability that is the source of NATO's problem.

If neither side has BMD, any undispersed forces will be destroyed by ballistic missiles. This works to the great advantage of the Soviets. In this example, the Soviets end up saving 250 of their GPFs but NATO only saves 50 of its GPFs. By launching a surprise ballistic missile attack, the Soviets have gained a 5 to 1 advantage in surviving GPFs ($GPFR_{sov} = 5$). This gives them a strong military incentive to start a war. Thus, Europe is very unstable if neither side has BMD.

Now suppose both sides build a small BMD system with 4000 interceptors each. Our calculations show that NATO would be able to save 146 of its 250 undispersed GPFs. Added to its 50 dispersed GPFs, NATO would have a total of 196 surviving GPFs instead of the 50 we would have if we had no BMD.

Of course, the Soviet BMD would allow them to save some of their undispersed GPFs also. They would be able to save 148 of their 150 vulnerable GPFs. Added to their 250 dispersed GPFs, this means the Soviets would end up with a total of 398 surviving GPFs. So the Soviet advantage over NATO would be reduced from 5 to 1 to about 2 to 1 (398/196).

The Soviets would have much less incentive to start a war to gain a 2 to 1 advantage than they do to gain a 5 to 1 advantage. Without BMD, few of NATO's forces survive so the Soviets would be certain of an easy victory in an invasion of Europe. If NATO had a BMD (even if the Soviets also had one), many more NATO forces could be saved; the Soviets would be much less confident of the outcome of an invasion and so would have much less reason to start one.

Graph A illustrates the effects of BMD on stability in Europe. The horizontal axis shows the number of interceptors deployed by NATO and the vertical axis shows the number of interceptors deployed by the Soviets.

The curve labeled $GPFR_{sov} = 5$ shows all combinations of NATO and Soviet BMD deployments where the Soviets could gain a 5 to 1 advantage in surviving GPFs by launching a surprise attack on NATO's conventional forces. The curve labeled $GPFR_{sov} = 2$ is defined similarly. Finally, the curve labeled $GPFR_{nato} = 2$ shows the points where NATO could gain a 2 to 1 advantage by launching a surprise attack on the Soviet GPFs.

There are six important points to note:

1) At the point (the origin) where neither side has a BMD, the Soviets would gain a 5 to 1 advantage over NATO in surviving general purpose forces. Europe without a BMD system is very unstable.

2) One common rule is that the attacker cannot feel confident of victory unless he starts with a 2 to 1 advantage over the defender. By this rule, the large area to the north and east of the $GPFR_{sov} = 2$ and the $GPFR_{nato} = 2$ lines is stable. This 2 to 1 rule is supported by some military experience, but the exact numbers used to define the stable region are not the critical issue here. The real point is that even small deployments of BMD lead to great reductions in the Soviet advantage in general purpose forces surviving after a ballistic missile exchange; this must be "stabilizing."

3) NATO can greatly reduce the Soviet incentive to start a war by deploying rather small numbers of interceptors. For example, if the Soviets deploy no

BMD, NATO could reduce $GPFR_{sov}$ from 5 to 2 by deploying about 2000 interceptors.

4) Even if the Soviets deploy 4000 interceptors, NATO can still reduce $GPFR_{sov}$ from 5 to 2 by deploying 4000 interceptors of our own. Thus, a NATO BMD, even if matched by the Soviets, would reduce the Soviet incentive to start a war.

5) Notice that NATO's principal problem here is not the vulnerability of our own ballistic missiles. In the example of Chart A, we assume that NATO has 1500 submarine-based RVs which are invulnerable to Soviet attack. Yet, with no BMD, NATO ends up at a great disadvantage after the ballistic missile exchange. NATO's problem is that, by dispersing before a surprise attack, the Soviets can make their general purpose forces asymmetrically invulnerable to NATO's retaliatory RVs. But, since NATO cannot disperse before a Soviet surprise attack, we need a BMD to reduce the extreme vulnerability of our general purpose forces.

6) The slopes of the curves show that deploying a BMD is a very effective way to stop the other side's surprise attack but a very ineffective way to prepare for a surprise attack of our own.

At point A, NATO has about 2250 interceptors and the Soviets have about 300. Either side could gain a 2 to 1 advantage by attacking first.

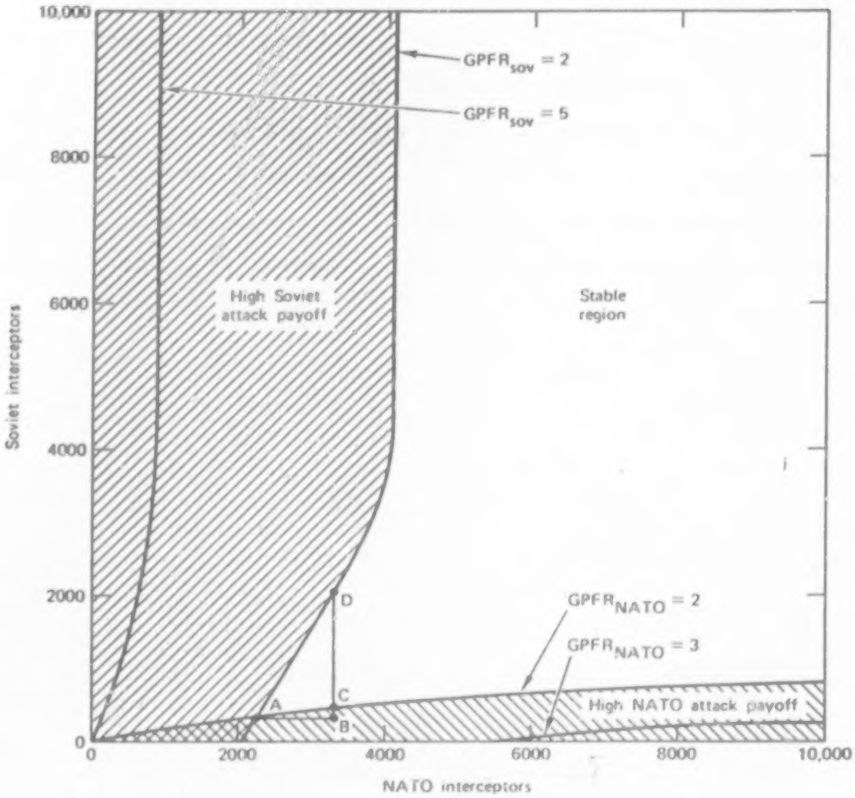
Now let NATO deploy 1100 more interceptors so that we would be at point B where the Soviet post-surprise-attack advantage in general purpose forces has been reduced from 2:1 to 1.5:1. Some critics of BMD claim that this increase in NATO's BMD would provide an incentive for NATO to strike first.

Actually, $GPFR_{NATO}$ does increase very slightly from 2 to about 2.1. If the Soviets are worried about this small increase in the NATO incentive to attack, they can counter it by building only about 120 more interceptors (moving from point B to point C). Thus their own BMD system serves to defend the Soviets. But, they would have to build about 1800 additional interceptors (moving from point B to point D) to get back to a position where they have a 2 to 1 post-attack advantage.

A further small increase in NATO interceptors would make it totally impossible for the Soviets to regain a 2 to 1 advantage in surviving GPFs. In contrast, the Soviets can easily eliminate any advantage NATO might gain from starting a war. As both sides increase their level of BMD deployment, Europe becomes more and more stable.

Graph A:

EUROPEAN CONVENTIONAL FORCE BALANCE AFTER BALLISTIC MISSILE STRIKE AND COUNTER-STRIKE



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*The parameters on the following page were input into the model to derive this graph.

Assumptions of the Graph:

Preferential Defense
Interceptor Single-Shot Kill Probability against an RV = .7
RV Single-Shot Kill Probability against a target= .9
Defender has shoot-look-shoot capability

	NATO	Soviet
Land-based RVs	200	3000
Submarine-based RVs	1500	1000
Total GPFs	350	400
Soviets Attack First		
Vulnerable GPFs	300	150
Dispersed GPFs	50	250
NATO Attacks First		
Vulnerable GPFs	150	300
Dispersed GPFs	200	100

Soviet Short-Range Ballistic Missiles

now a conventional deep-strike mission

*by Kerry L. Hines**

Short-range ballistic missiles (SRBMs)** are an increasingly important part of Warsaw Pact planning for the conventional phase of a potential conflict with NATO. However, Western appreciation of this development has been overshadowed by concern over Soviet deployments of the intermediate-range SS-20 nuclear systems, and over the impact on the conventional threat of concepts such as operational manoeuvre groups.

Yet the Warsaw Pact's clear superiority over NATO in total numbers of SRBMs, including systems that can reach West European targets from Warsaw Pact territory poses a significant threat to NATO forces and rear areas. Moreover, new SRBMs with increased range, accuracy and conventional warhead options are being developed and deployed, which will give the Warsaw Pact a reliable deep-strike capability against the West. Of special concern for NATO is the ability of these missiles to penetrate and suppress air defenses, as well as to support deep strikes by the modernized and expanded Warsaw Pact tactical air forces.

SRBM system development

According to the Soviets, the communist leadership recognized the potential of rocket technology as early as 1921 when it began to support the research of Konstantin Tsiolovskiy and others.[1] Despite setbacks suffered during Stalin's purges of the 1930s, Soviet research pursued liquid fuel and solid-fuel rocket-motor technologies simultaneously. The latter came to fruition in the early 1940s with the development of the BM-13 *Katyusha* multiple rocket launcher system which the Soviets deployed extensively in World WarII. Liquid-fuel technology focussed on rocket boosters for aircraft.

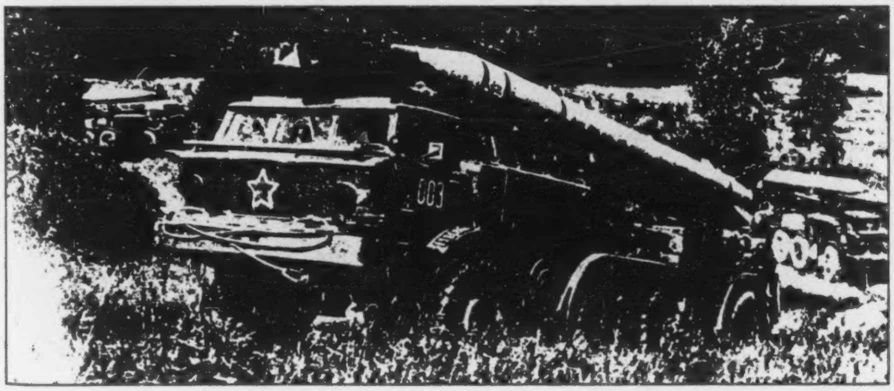
It was the capture of German scientists, facilities, technology, and large stocks of V-2 rocket components, however, which provided the real foundation for current Soviet SRBM programs. In 1945, a scientific-technical council for rockets was established under the Commissar for Armaments, D.F. Ustinov (later minister of defense), and by October 1947, "development work on the first Soviet rocket, the R-1, was completed and it was issued to Soviet troops soon afterwards."[2]

Soviet post-war missile development and production programs were assigned to the Main Artillery Directorate (*Glavnoye Artilleriyskoye Upravleniye*, or GAU) and the first missiles deployed with Soviet forces were placed with the Ground Forces' artillery. The GAU's functions were expanded in the early 1950s as a result of the introduction of nuclear weapons and missiles (the Soviets tested their first nuclear weapon in August 1949) and its name was changed to the Main Rocket and Artillery Directorate (GRAU). The strong influence of Soviet artillerymen on the SRBM R&D program and the prevailing view at the time that missiles were essentially long-range artillery have had a lasting impact on Soviet SRBM systems development, unit organization, and operational concepts.

● *Early nuclear missiles:* The first SRBM the Soviets deployed with their Ground Forces, the SS-1 *Scunner* (NATO designation) was basically an improved version of the V-2 rocket. It was cumbersome, inaccurate and conventionally armed. In the early 1950s the Soviets deployed their first nuclear-capable SRBM, the SS-2 *Sibling*, which featured improvements in range and reliability, but was still an unwieldly battlefield weapon. The Soviet military was, however, committed to equipping the armed forces with nuclear missiles because many Soviets considered that the great destructive power of nuclear warheads, combined with the relative invulnerability of long-range missile delivery systems, created near-perfect weapons. The Soviets felt that these weapons would cause a "revolution in military affairs".[3]

In the 1950s the Soviets began fielding their second generation Ground Forces' SRBMs. The *Frog* 1 (Free Rocket Over Ground) was the first of a

▼The *Frog* 7 shown in battalion field training is a second generation tactical SRBM still widely deployed in Warsaw Pact forces. *(Photo: Soviet military press)*



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* The author is a Lieutenant Colonel on active duty, assigned to the Army Staff in Washington, D.C. The views expressed in this article are his own and do not necessarily reflect those of the US Army.

** "Short range ballistic missile" as a Western term technically applies only to guided surface-to-surface missiles. The Soviets, however, use the word *raketa*, which may be accurately translated as either rocket or missile. In this article the term SRBM refers to both unguided rockets and ballistic missiles.

family of short-range, solid-fuel, unguided rockets — the latest of which, the *Frog* 7, is still deployed in large numbers with Warsaw Pact forces. The SS-lb *Scud* A, the forerunner of the *Scud* series, was a liquid-fuelled, radio-command guided missile that, at least in external appearance, still reflected its German V-2 parentage. These systems had better range, accuracy and mobility than first generation SRBMs.

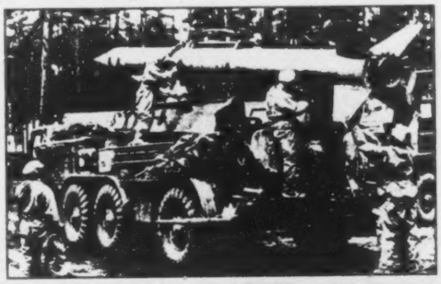
Although conventional and chemical warheads were developed for the second generation SRBMs, nuclear strikes clearly were the primary mission of the Ground Forces' rocket troops. This mission received strong emphasis in the Warsaw Pact military literature of the 1960s and 1970s.[4] The inaccuracy of the SRBMs, which in some cases caused warhead delivery errors of a kilometer or more, also argued for nuclear strikes as the primary mission. For example, during the 1973 Middle East War, Arab forces reportedly employed both *Frogs* and *Scuds* against Israeli targets, but with little effect, principally because the delivery error was greater than the radius of effectiveness of the conventional warheads. More recently, *Scud* missiles have apparently been used in the Iran-Iraq war as "terror weapons" for indiscriminant strikes against population centres; however, there are no indications of attempts to strike military targets, possibly because of expected ineffectiveness. SRBM inaccuracy also helps to explain the apparent Soviet preference for large "tactical" nuclear warheads, with a wide radius of damage, which can compensate for the large delivery error.[5]

● *Emphasis on accuracy:* The Soviets are now deploying their third generation SRBMs. These are highly accurate, reliable and mobile battlefield weapons, equally suited for nuclear and non-nuclear operations. The capabilities of these systems were addressed by Colonel General Mikhalkin, Commander-in-Chief of the Rocket Troops and Artillery, in 1984:

"The latest discoveries and achievements of science and technology have made possible the provision of the Rocket Forces and Artillery of the Land Forces with highly precise and reliable tactical and battlefield missile complexes carrying conventional and nuclear warheads...." Mikhalkin further notes that these missile capabilities, in combination "with modern means of reconnaissance and fire control, and of automation and communications... present a really formidable force."[6]

Although Soviet General Tyushkovich, listing the trends in Soviet SRBM improvement programs, included reduction of weight and overall dimensions, increased manoeuvrability, greater range and accuracy, better means of control and improved operational specifications in his 1978 book, other authors indicate that the emphasis is on range, accuracy and warhead effectiveness. The major efforts in regard to accuracy concern guidance, during both the active (powered) phase and the passive (ballistic) phase of the missile's flight. Among these efforts are "combined guidance systems" such as improved inertial guidance with an in-flight update from a ground station or with terminally guided warheads or submunitions.[7] The former "reduces the maximum circular error to a few hundred meters", while the latter combination "provides an approximately ten-fold decrease in the maximum circular error" of the missile strike.[8] Since the accuracy of an inertial guided missile is range-dependent, the use of a combined guidance system would be particularly advantageous for the longer-range SRBMs.

According to the 1985 edition of the US DoD's *Soviet Military Power*, the increased accuracy of the newest SRBMs makes possible their effective use" with conventional and improved conventional munitions warheads" and "improvements in guidance and control, warhead capabilities and accuracies are expected."



◀Reload training for the *Frog* 7. *(Photo: East German military press)*

▼An SS-1c *Scud* battery in field training. These "tactical-operational" missiles are deployed at army an Front level in Warsa Pact ground forces *(Photo: Soviet militar press)*

SRBM warhead development

Efforts to develop realistic conventional warhead options for SRBMs represent a new direction in Soviet R&D. The shift from an almost exclusively nuclear role to a more balanced nuclear-conventional role is motivated by two main factors. First, Soviet military doctrine has evolved since the nuclear "fixation" of the 1950s and 1960s, and second, the Soviets now claim that advanced technology is giving conventional weapons a degree of effectiveness approaching that of low-yield nuclear weapons, thus providing greater assurance of achieving target damage norms.

The Soviets have an unequivocal belief in the decisive role of firepower in modern combat and emphasize the absolute necessity of establishing and maintaining overwhelming fire superiority over any opponent from the very onset of hostilities.

In the immediate post-war period the Soviets sought to fulfill these doctrinal firepower requirements with nuclear weapons. However, by the late 1960s Soviet military theoreticians had begun to reexamine the practicality and feasibility of conventional operations in a modern conflict. Commentary by the Soviets on NATO exercises following the adoption of the concept of "flexible response" indicated that they viewed a four to five day initial conventional phase as realistic in a major war. Further evolution of this thinking has now led the Soviets to consider that a majo conflict may remain conventional for a extended period, and that in "peripheral" theatres, it could be limited t conventional weapons only.

● *Increased fire support:* In the course of "re-discovering" conventional operations, the Soviets have refined their fire support concepts and the Soviet *Military Encyclopaedic Dictionary* now distinguishes between nuclear and conventional strikes. At the same time they became concerned about the ability of their Ground Forces to maintain the high rates of advance necessary for successful offensive operations without benefit of the wholesale destruction of opposing enemy forces expected from nuclear strikes. In order to achieve these

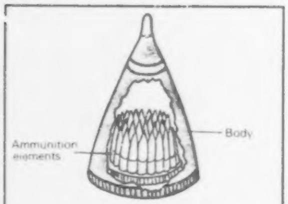


Figure 1 Soviet view of one variant for a warhead with submunitions, adapted from the 1968 *Artilleriya i rakety* and from *Fisicheskie Osnovy raketnovo oruzhii* (Physical Principles of Rocket Weapons), Moscow, 1972

desired levels of destruction, the Soviets resurrected the "air operation" as an operational concept intended to achieve fire superiority within a theatre. For lower levels (tactical and operational) the concept is called "integrated fire destruction of the enemy". The goal of this concept, and probably of the air operation as well, is to destroy 50 to 60 percent of the enemy's major fire support weapons through the closely coordinated and integrated fires of all available aircraft, missiles, rockets, artillery and direct-fire weapons.[9]

- *Improved targeting:* The Soviets pay special attention to the impact of technology on conventional weapons and particularly to the linking of highly-accurate delivery systems for conventional munitions with reconnaissance/target acquisition means through an automated control net for real, or near-real-time strike systems. An example of this capability, frequently cited by the Soviets, is the US "Assault Breaker" system, which the Soviets term a "reconnaissance-strike complex".[10]

One of the most extensive Soviet statements on the capabilities of modern conventional weapons was made by Marshal N.V. Ogarkov in a May 1984 interview in *Krasnaya Zvezda*, while still Chief of the General Staff. He listed the changes in conventional weapon capabilities as one of the fundamental developments in current military affairs: "...rapid changes in the development of conventional means of destruction and the emergence in the developed countries of automated reconnaissance-strike complexes: long-range, highly-accurate, terminally guided weapon systems; unmanned flying machines; and the qualitatively new electronic control systems make many types of weapons global and make it possible to increase sharply (by at least an order of magnitude) the destructive potential of conventional weapons, bringing them closer, so to speak, to weapons of mass destruction in terms of effectiveness. The sharply increased range of conventional weapons makes it possible immediately to extend active combat operations not just to border regions, but to the whole country's territory, which was not possible in past wars."

- *Single warheads or submunitions:* Soviet interest in developing reliable conventional warheads for SRBMs dates from at least 1968. In a book published that year, Marshal of Artillery Kazakov raised the following question: "Is it appropriate to have only a single application of missiles in combat?"[11] He suggested that missiles with 500 to 1,000kg unitary high-explosive warheads could be effective against many "harder" targets, such as fortified defenses, bridges, dams or industrial and administrative centres.

He also devoted considerable attention to the employment of warheads with submunitions (see *Figure 1*) against "softer" targets and enemy personnel, warheads which he considered to have the following advantages in terms of destructive effect and range:

1. The missile's total area of destruction can be increased if a 500 to 1,000kg unitary high-explosive warhead is replaced by submunitions totalling an equal weight.
2. The destructive effect of each submunition is equal to that of an artillery round.
3. Submunitions are of diverse types and destructive power, such as fragmentation, armour piercing, shaped charge, smoke or incendiary.
4. The destructive effect of a single warhead with submunitions equates to the simultaneous salvo of 40 to 100 or more artillery weapons, but strikes can be delivered on targets at ranges of 300km or more.

A more recent Soviet book develops the artillery analogy regarding the employment of missiles with "bomblet" warheads: "During the massive and sudden employment of missiles against unprotected military personnel and equipment, especially those located in the depths of the forces' dispositions, one to three missiles (depending on the type of target) on a position can cause the same level of destruction to the enemy as a battalion of long-range artillery expending several hundred shells".[12]

The Soviets also find the use of missiles against targets "beyond the range of field artillery," expedient because of their speed and altitude and the same source notes that "the use of a missile can replace a number of aircraft sorties, which are expensive and which stand a chance of being destroyed by the enemy's air-defense means."

The Warsaw Pact's concerns about executing effective aviation strikes in a strong air-defense environment have been discussed frequently in the military literature, especially the need for support to aviation from other forces. Warsaw Pact commanders clearly see their SRBMs, with their potential for penetrating opposing air defenses, as a response to this need. They would, however, expect SRBM strikes to do more. For example, in an air operation, "the Rocket Troops would conduct attacks using warheads with submunitions against enemy air-base targets, air defenses, and command and control systems."[13]

- *SRBM conventional submunitions:* The *Soviet Military Encyclopaedia* lists a variety of targets for the SRBMs of the Rocket Troops of the Ground Forces, including: enemy nuclear systems, aircraft on airfields, air-defense targets, main troop groupings, operational reserves, command and control posts and centres, depots of reserve materiel and equipment, lines of communications nodes and other important objectives in the operational rear.[14] Discussions in Warsaw Pact military and technical literature would indicate that most target types are being considered for conventional missiles. While examining a variety of conventional munitions (*Table 1*), the Soviets and their allies are also studying attack techniques that would limit target manoeuvre or disrupt command and control in those situations where the effect of fire might be insufficient to neutralize the target.

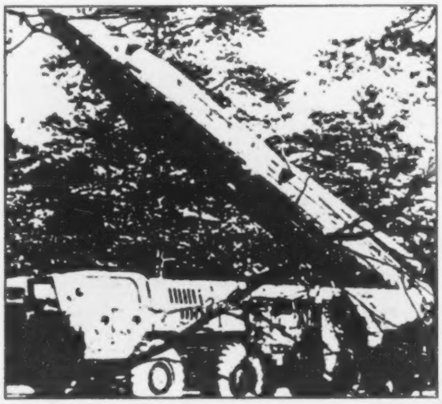
Table 1: **Possible Soviet conventional warhead types**

Unitary	Submunition*
High-explosive (HE)	High-explosive
Fragmentation	Fragmentation
HE fragmentation	HE fragmentation
Incendiary	Incendiary
Fuel-air explosive (FAE)	Shaped charge
Shaped charge	Smoke
	Anti-armour
	"Bomblets" and "minelets"

*Submunitions may be unguided or terminally guided

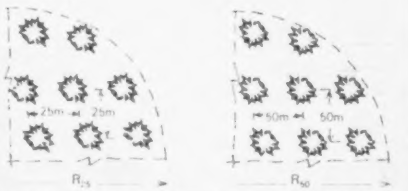
Blast-enhanced and fuel-air explosive (FAE) munitions, which the Soviets have examined through selected "material from the foreign press", are the kind of the conventional weapons which could, in their view, approach the effectiveness of low-yield nuclear weapons. For example, the American BLU-82 aerial bomb has been mentioned as a blast-enhanced weapon, generating a shock wave "capable of causing heavy destruction within a radius of up to 500m, which is fully comparable with the effects of an low-yield nuclear explosion."[15] According to the same source, the American US CBU-55 (225kg) cluster bomb, an example of an FAE weapon, generates "a powerful shock wave... with an overpressure of more than 20kg/cm² and destroys even strong reinforced concrete structures."

The example of a 500 to 1,000kg FAE warhead used in the Soviet literature would certainly create a considerably larger shock wave than the 225kg cluster bomb. If delivered by a highly-accurate SRBM, an FAE warhead probably would produce sufficient overpressure to damage some above-



▲The SS-12 *Scaleboard* transporter/launcher. The missile is believed to have only nuclear warheads, but the improved accuracy of its newer version, known as the SS-22, could make it effective for conventional warheads. *(Photo: Hungarian military press)*

Figure 3: Representative dispersion patterns for submunitions based on Soviet norms for planning fire concentrations with 100mm and larger ("standard") artillery weapons



R_{25} = radius of beaten zone for 25-meter submunition separation.

R_{25} for 40 submunitions = 79m

R_{25} for 100 submunitions = 158m

R_{50} = radius of pattern for 50-meter submunition separation.

R_{50} for 40 submunitions = 125m

R_{50} for 100 submunitions = 250m

ground concrete structures, such as aircraft shelters and munitions bunkers, and possibly some underground command and control facilities. It would be highly effective against soft targets such as electronic-equipment shelters, radars, aircraft and personnel.

● *Warhead effectiveness:* The theoretical effectiveness of warheads with submunitions may be illustrated by building on the artillery analogy suggested by the Soviets themselves; that is, that a submunition is equivalent to an artillery round (one may safely assume standard 122mm to 152mm artillery) and that a missile warhead carrying submunitions is equivalent to a salvo of 40 to 100 or more artillery projectiles. The data in *Figure 3* and *Table 2* have been derived by applying Soviet artillery norms. During the planning of artillery fire concentrations, the Soviets assign a frontage of 25 to 50m to a single 100mm or larger artillery weapon.[16] This indicates that the Soviets consider this appropriate spacing for "standard" artillery, and they could well consider this a design goal for the dispersion of the individual submunitions from a warhead.

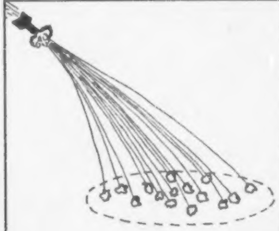


Figure 2: The operation of a warhead with submunitions depicted in the 1968 book *Artilleryа i rakety*

In a like manner, the number of missiles with submunitions that theoretically would achieve damage norms against selected type-targets has been computed using Soviet norms for unobserved medium-calibre artillery fire. Although the computations in *Table 2* assume a direct hit, a dispersion pattern several hundred meters in diameter probably would accommodate a combined target location error and warhead delivery error of about 100m, without seriously degrading strike effectiveness. As shown in the table, the Soviets potentially could achieve their damage norms for many soft area targets with a small number of SRBMs per target.

SRBM systems

While developing successively more capable SRBMs, the Soviets have improved their older systems and expanded the total number of deployed launchers. The Warsaw Pact currently has over 1,600 second and third generation SRBM launchers deployed with its ground forces.[17] Although the majority of the SRBMs are in the hands of Soviet troops (see *Table 3*), non-Soviet Warsaw Pact forces alone have more SRBMs than NATO's total of 300. The Warsaw Pact classifies its SRBMs as "tactical" and "operational-tactical" based on range and intended use.

In Soviet terminology, tactical missiles are either guided (to include terminally guided) or unguided, and armed with nuclear or conventional warheads which do not separate from the body. The missiles, either liquid or solid fuelled, are launched from wheeled or tracked, self-propelled launchers. These small ballistic missiles are employed in immediate support of combat forces and intended for the destruction of targets located in the enemy's tactical depths, generally at ranges no greater than 100km. These missiles also can perform ECM and mine laying tasks.

Operational-tactical missiles are guided (to include terminally guided) missiles armed with nuclear or conventional warheads. These missiles are employed in major combined-arms formations and intended for the destruction of targets located in the enemy's operational depths. The maximum range of these missiles is not over 1,000km. As a rule, these missiles are transported on, and launched from, wheeled or tracked, self-propelled launchers. The term operational-tactical is used only by the Warsaw Pact; in other countries these missiles are referred to as tactical missiles.

● *Frog and SS-21:* Warsaw Pact tactical missiles include the *Frog* and SS-21 *Scarab* systems. The *Frog* 7, introduced around 1965, generally has replaced the earlier *Frog* 3 and *Frog* 5 models in active manoeuvre divisions.[18] A modified version of the *Frog* 7, the 7B, was introduced in 1968 and has a longer warhead section than the original (7A). The *Frog* 7 is a solid-fuel, fin and spin stabilized, unguided rocket with a maximum range of about 70km and nuclear, conventional or chemical warheads. Its launcher is mounted on a ZIL-135 eight-wheeled vehicle which gives the system excellent cross-country mobility. A companion ZIL-135 resupply vehicle carries three reloads. The *Frog* system normally is deployed in a battalion of four launchers with motor-rifle and tank divisions. In battlefield operations, time required to emplace the launcher and prepare to fire after arrival at a pre-surveyed site is 15 to 30 minutes.

Since the late 1970s, the Soviets have been deploying SS-21s to replace *Frogs* in tank and motor-rifle divisions.

Table 2 **Theoretical missile expenditure requirements**

Target[1]	Fire mission[2]	Artillery norm (in rounds) 122mm	152mm	Comparable missile norm[3]
Missile launcher	Destruction	300	200	2 to 8
SAM battery	Suppression	150	100	1 to 4
Unprotected vehicle-mounted radio or radio station, or radar control post	Suppression	180	120	2 to 5
Unprotected personnel and weapons in concentrated areas, deployment or attack positions	Suppression (per hectar — 100 × 100 meters)	20	15	1
Command post (unhardened/in vehicles)	Suppression	50	40	1

[1] Target type, fire mission and artillery norms (in rounds) are taken from the table "Ammunition Expenditure Norms for Defeating (Damaging) Unobserved, Immobile Targets," in the Soviet *Handbook for Field Artillery Officers*, pp. 373-375.

[2] Destruction is the standard damage norm for all nuclear-capable targets and is intended to place the target in a combat ineffective posture. Suppression is the standard norm for air-defense, command and control and large-area targets. Its objective is temporarily depriving the target of its combat effectiveness, limiting its manoeuvre or disrupting its command and control.

[3] Where there is a range of figures, the lowest is based on a warhead with submunitions comparable to 100 × 152mm rounds. The highest figures are based on warheads equivalent to 40 × 122mm rounds.

The SS-21 was first deployed in the USSR in 1976; in 1981 the SS-21 was observed with Soviet forces in East Germany and it was first openly displayed in the Red Square parade of 9 May 1985. The extent to which the SS-21 has been deployed with Warsaw Pact forces is unknown; however, in early 1984 NATO reported that the Soviets had about 40 SS-21 launchers with their forces in East Germany. The SS-21 launcher is mounted on a six-wheeled, lightly armoured, amphibious vehicle similar to the SA-8 *Gecko* surface-to-air missile system transporter. The SS-21 has a maximum range of about 120km and is believed to have nuclear, chemical and conventional warheads. Overall system improvements should give the SS-21 a battlefield reaction time at least as good, if not better, than the *Frog*.

● *Scud and SS-23*: Operational-tactical missiles are found in the major combined-arms formations, primarily at Front and army levels, in the Warsaw Pact ground forces. Soviet SRBMs in this category include the SS-1c *Scud* B, SS-23 *Spider* and SS-12/22 *Scaleboard* systems.

The *Scud* B was introduced around 1961 and generally has replaced the earlier *Scud* A models. This system normally is deployed in army and Front brigades of 12 to 18 launchers, although variations in brigade structure are likely. The original tracked launcher was replaced by an eight-wheeled, modified MAZ-543 vehicle in 1965. The *Scud* B missile has a maximum range of approximately 300km and can be armed with nuclear, conventional or chemical warheads. The *Scud* is a single-stage, liquid-fuelled, inertial guided missile. Time required to emplace the launcher and prepare to fire in a pre-surveyed firing site is about 60 minutes.

The replacement for the *Scud*, the SS-23, has improved accuracy and a range of about 500km. It probably has a solid-fuel motor, providing the advantage of relatively easy maintenance and storage, avoiding the complex and dangerous task of handling toxic liquid fuel, and eliminating the bulky support equipment needed for liquid fuel. Solid fuel would also considerably improve reaction and refire times. The SS-23 launcher is apparently based on an eight-wheeled MAZ chassis and is expected to have both nuclear and conventional warhead options.

● *SS-12/22s:* Since 1967 the Soviets have deployed limited numbers of the SS-12 *Scaleboard* missile system in Front or theatre brigades of 12 to 18 launchers. The *Scaleboard* is a two-stage, solid-fuel, inertial guided missile with a range of about 900km. The SS-12 launcher uses the same MAZ-543 chassis as the *Scud* launcher, but has an environmental protective container that completely encloses the missile. The SS-12 is believed to have only nuclear warheads. In 1979, the Soviets introduced a modified missile, originally called in the West the SS-22, with the same range as the basic SS-12 but with improved accuracy, which would make it effective with conventional, as well as nuclear warheads.

In 1984, the Soviets rebased some of their SS-12/22 missiles from the USSR to East Germany and Czechoslovakia allegedly as "countermeasures" to NATO INF (intermediate nuclear forces) modernization. It is estimated that the Soviets currently have about 50 SS-12/22 missile launchers in East Europe and an additional reload missile for each launcher. This marks the first time these systems have been deployed outside the USSR and would allow the Soviets to accomplish strikes throughout most of Western Europe without having to forward deploy during wartime.

With an estimated annual production rate of 300-350 SRBMs, the Warsaw Pact is likely to have accumulated substantial stocks of reload missiles. Missile resupply to fire units is provided by technical support assets in fire units and special technical units that are part of the rear-area support structure. The technical support assets carry at least one reload missile for each launcher, but the total number of reload missiles varies from system to system. For example, in *Frog* battalions the resupply vehicle that accompanies each launcher carries three reload missiles. The special technical units transport missiles and warheads, perform technical services and prepare missiles for firing. These mobile support units will deploy on the battlefield behind the launch units to assure the timely supply of reload missiles and warheads.

Implications

Throughout the post-war period the Warsaw Pact has steadily improved and expanded its SRBM force, and further improvements are expected. The capabilities of the most modern systems give Warsaw Pact commanders flexible, responsive, survivable and effective deep-strike firepower weapons for either nuclear or conventional operations. Improved accuracy and advanced warhead technology will permit Pact commanders to plan conventional strikes against many targets with a high assur-

Table 3 **Warsaw Pact short range ballistic missiles**

Designation	System	Date introduced	Maximum range (km)	Warhead types	Reaction time (min after arrival at launch site)	CEP (m)	Launcher vehicle	No. deployed Soviet forces	No. deployed NSWP* forces	Total
Tactical	*Frog* 7	1965(7A) 1968(7B)	70	nuclear, conventional, chemical	15–30	< 500	ZIL 135 (8 × 8)	600	200	800
	SS-21 *Scarab*	1976	120	nuclear, conventional, chemical	probably < 30	< 100	Mod. ZIL (6 × 6)			
Operational tactical	SS-1c *Scud* B	1961	300	nuclear, conventional, chemical	up to 60	< 1,000	MAZ 543 (8 × 8)	585	120	705
	SS-23 *Spider*	early 1980	500	nuclear, conventional	probably < 30	unknown	Mod. MAZ (8 × 8)			
Operational tactical	SS-12 *Scaleboard*	1967	900	nuclear	up to 60	< 1,000	MAZ 543 (8 × 8)	120	—	120
	SS-12/22	1979	900	nuclear, possibly conventional	up to 60	unknown	MAZ 543 (8 × 8)			

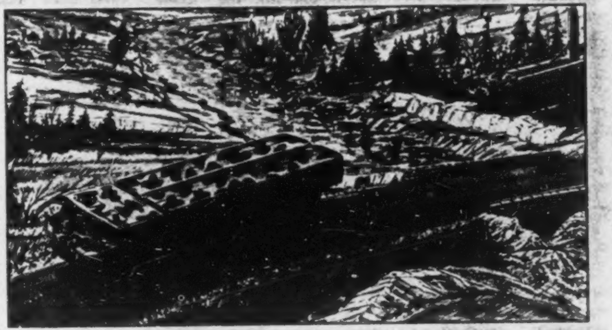
*Bulgaria, Czechoslovakia, East Germany, Hungary, Poland and Romania ance that damage norms will be achieved. At the same time, improved mobility, faster reaction time and reduced support requirements of the latest SRBMs will create a much more difficult targeting problem for NATO. Increased range may allow the SRBMs to operate from firing positions further rearward, out of range of many NATO ground-based fire support assets.

Although rear area facilities and assets generally have better air defenses than forward area forces and are less exposed to "direct" combat action, they are typically less mobile and softer. Thus, they are, for the most part, more vulnerable to SRBM strikes that can penetrate air defenses and, with short flight times, allow little warning of an attack. SRBM strikes against NATO surface-to-air missile (SAM) units, air-defense early-warning radars, and air-defense fighter bases could disrupt and disorganize NATO's ability to repel massed air attacks against rear area targets.

In the forward battle area, where targets would typically be more mobile and have greater armoured protection, SRBM strikes could be used for remote mining to block the movement of reserves and counter-attack forces, against command and control posts to disrupt the cohesion of the defense, and for air-defense suppression in support of tactical heliborne assaults or close-air support activities. The longer ranges and improved responsiveness of the newer systems will allow Warsaw Pact commanders to shift and mass fires more easily without a corresponding requirement to redeploy and mass weapons.

The employment of conventionally-armed SRBMs may also have some disadvantages for Warsaw Pact forces. It would increase the complexity of an already complex fire-support process. Complete and effective integration of missile strikes with artillery, aviation, and other fire-support assets may be possible only with full automation of the fire-support process. The execution of effective strikes also will place heavy demands on the target-acquisition process. Gains in missile accuracy may be readily offset by large target location errors or by delays in the transmission of data on mobile targets. Finally, although missile improvements may reduce support requirements, in the near term the support structure must handle the requirements of both the older and newer generation systems until all older systems are replaced.

▼The SS-23 successor to the *Scud* has a range of about 500km. Its deployment is anticipated in East Europe and Asia. *(Photo: Soviet Military Power)*



Short range ballistic missiles represent only one component of the total force package the Warsaw Pact is developing for the execution of high-tempo, deep-reaching conventional operations against NATO, but it is the one component for which NATO is least prepared. ◆◆

Notes

1 E.S. Fridenson. *Osnovy Paketnoi Tekhniki* (The Fundamentals of Rocket Technology). Moscow Military Publishing House of the Ministry of Defense (hereafter MPH), 1973, p.16.

2 S.A. Tyushkevich et al., *The Soviet Armed Forces: A History of their Organizational Development*, Moscow: MPH, 1978, republished in English under the auspices of the US Air Force, US Government Printing Office, Washington, DC, p.380.

3 See, for example, N.A. Lomov, ed., *Scientific-Technical Progress and the Revolution in Military Affairs*, Moscow: MPH, 1973, republished under the auspices of the US Air Force, Government Printing Office, Washington, DC, 1974. The Soviets now refer to the "evolutionary" rather than "revolutionary" introduction of missiles and nuclear weapons.

4 The difference between Soviet views of the 1960s and those of the 1980s is evident in the two editions of *Taktika* (Tactics). The 1966 edition has an almost exclusively nuclear focus, while the 1984 edition has a more balanced nuclear-conventional approach.

5 *Soviet Front Fire Support*, Defense Intelligence Agency, Washington, DC, 1982, p.73, indicates that the Soviets consider "tactical" nuclear weapons to include warheads of at least 400kt.

6. Colonel General Vladimir Mikhalkin, "The Homeland's Fire Shield," *Soviet Military Review*, No. 11, November 1984, p.19.

7 A. Starostin, "Takticheskiye Rakety" (Tactical Rockets), *Tekhnika i vooruzheniye* (Equipment and Armament), No. 11, November 1981, pp. 8-9.

8 *Ibid.* Mr. Richard D. DeLauer, former US Under Secretary of Defense for Research and Engineering, stated in a press interview that "the new, upgraded models of these SS-21, SS-22 and SS-23 missiles have accuracies making it possible to hit within 30m of a target." Walter Andrews, "Allies weapons said to be inadequate to threat of new Soviet missile power," *Washington Times*, 1 November 1984, p.3.

9 *The Soviet Conventional Offensive in Europe*, Defense Intelligence Agency, Washington, DC, 1982, pp. 41-43.

10 See for example, "Sistema 'Assolt Breyker'" (The "Assault Breaker" System), *Aviatsiya i kosmonavtika* (Aviation and Cosmonautics), No. 1, January 1982, pp. 46-47, and A. Sergeyev, "Razvedivatel'no-udarniye kompleksy" (Reconnaissance-Strike Complexes), *Krasnaya Zvezda*, 14 February 1985, p.1.

11 Marshal K.P. Kazakov (chief editor), *Artilleriya i rakety* (Artillery and Missiles), Moscow: MPH, 1968, pp. 341-344.

12 B.T. Surikov, *Boyevoye primeneniye raket sukhoputnik voysk* (Combat Employment of Ground Forces' Missiles), Moscow: MPH, 1979, pp. 160-161.

13 Colonel Aleksander Musial, "Charakter i znaczenie operacji powietrznych we wspolczesnych dzialanoach wojennych" (The Character and Importance of Air Operations in Modern Warfare), *Przeglad Wojsk Lotniczych i Wojsk Obrony Powietrznej Kraju* (Air Force and Air Defense Force Review), March 1982, p.12.

14 *Soviet Military Encyclopaedia*, Vol. 7, p. 53.

15 V. Makarevskiy, "NATO Bosses Are Developing and Manufacturing Qualitatively New Types of Weapons Under the Hypocritical Designation of 'Conventional', Imperialism Unmasked," *Voyennyye Znaniye* (Military Knowledge), No. 10, October 1980, p. 30.

16 V. Ya. Lebedev, *Spravochnik ofitsera nazemnoy artillerii* (Handbook for Field Artillery Officers), Moscow: MPH, 1984, p. 127.

17 *Force Structure Summary — USSR, Mongolia, and Eastern Europe*, Defense Intelligence Agency, Washington, DC, 1984, pp. 15 and 27-32.

18 Data on SRBM systems are drawn from *The Soviet Army: Troops, Organization, and Equipment*, Washington, DC: Department of the Army, 1984, pp. 5-67 to 5-70; *Soviet Front Fire Support*, pp. 70-71 and 107-109; *Soviet Military Power* (1985), pp.38 and 67-68; and *NATO and Warsaw Pact — Force Comparison*, p.40.

Catching NATO Unawares

Soviet Army surprise and deception techniques

*by C.J. Dick**

Marx and Lenin teach that victory in war goes to the side with superior resources. This is a disheartening notion for the Soviet leadership as the Warsaw Pact is markedly weaker than NATO in almost every measure of military potential — size (and reliability) of population, wealth, industrial power and technological progress; only in currently deployed military strength is the Pact stronger. General Secretary Mikhail Gorbachev and the Soviet leadership well know that, in 1941, the Germans came within measurable distance of destroying Soviet communism, and that in order to preserve their power and system, the Soviets must avoid the repetition of such a war. They realize, as well, that a strategic nuclear exchange would make the last war look like a skirmish.

The Soviets do not, however, seem to conclude from this that a war against NATO cannot be won. Historically they have been conservative in their use of military force, and it would be difficult, in 1986, to postulate a plausible scenario for a decision to attack NATO, but they have by no means adopted the fashionable Western notion that war can no longer serve as an instrument of policy.

Surprise in its strategic context

The Soviets conclude instead that a war with NATO must be won very quickly, in its initial period; this is defined as "the period of time which elapses between the start of hostilities and the completion by the combatants of their mobilization, concentration and deployment." Of course, as the aggressor will have a considerable advance in preparations and mobilization over the defender, the concept of the initial period really applies only to the latter. This means that the Soviets must seize a vital area of NATO and destroy key combat groupings before NATO can either complete its defensive preparations or agree on the use of nuclear weapons.[1]

The Federal German Republic, the economic and military heart of NATO Europe, represents, in the Soviet view, just such a small and vulnerable area, which could be swallowed up in the course of a single, strategic offensive operation. The distance from the inner German border (IGB) to the Ruhr, across the North German Plain, is only 300-400km. The distance to Mainz through the Fulda Gap is only about 150km. In a significant comparison, the Soviets point out, that, in the Vistula-Oder operation during World War II, they advanced 500km on a front about 500km wide in 17 days — an average of 30km a day for combined-arms (infantry) armies and up to 70km a day for tank armies. In the process, 35 German divisions were totally destroyed and another 25 suffered 50-70% casualties. The Soviets see no reason why today's entirely mechanized army could not be at least as effective under favourable circumstances.

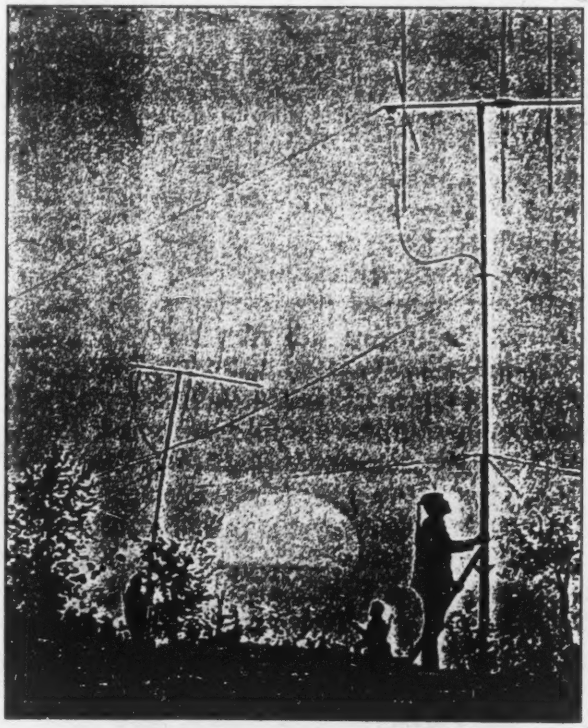
The Soviets identify five essentials for a quick victory. These are surprise, a heavy blow, a rapid advance, simultaneous attacks throughout the enemy's depth and air superiority.

The advantages of surprise

Recent Soviet writings stress that "the element of surprise has long been the most important principle of military art. ...The employment in modern combat of nuclear weapons, highly effective conventional weapons and highly mobile forces has drastically increased the role and significance of surprise strikes."[2] Surprise is seen to confer five advantages.

● NATO's reinforcement plans will be pre-empted and rendered largely unworkable. Given the alliance's maldeployment, it may even be possible to pre-

▼ Signals antennas of a field communications facility which could be used to confuse the enemy.



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* The author is a research associate at the Soviet Studies Research Centre, Royal Military Academy, Sandhurst.

> ***"NATO's senior commanders would do well to plan on the basis that they will (not may) be the victims of strategic surprise. To count on several days for preparation is to confuse warning time, which may exist, with preparation time, which almost certainly will not."***

vent some NATO corps from occupying FEBA positions; certainly surprise will thwart NATO's rather extensive obstacle and field fortification plan which could threaten the viability of Soviet tactical and even operational techniques. Instead of having to conduct difficult and costly breakthrough operations, the Soviets will impose their style of war, clashing with NATO formations while they are on the move, in a series of meeting engagements — a form of combat for which they train intensively, but which is ignored by most of the alliance armies. The Soviets believe that the meeting engagement will be the typical battle in the next war, and their tactics (so often derided by Western officers) are perfectly suited to such combats.[3]

- Surprise, and the initiative it confers, are seen to be force multipliers making it possible to achieve at least a limited strategic objective with much smaller forces than would be required against a prepared enemy. A particularly significant example is the Soviet attack on Manchuria in 1945 when the Red Army chose to strike with a superiority of only 1.2:1, but with the advantage of surprise.[4] The benefits of surprise in a future war are seen similarly to outweigh the disadvantages of incomplete mobilization. Since surprise obviates the need for breakthrough operations, there is no need for large, vulnerable concentrations and strong second echelons at every level.[5] In short, it undermines the rationale of both NATO's operational nuclear forces and the Deep Strike plan, at least in its deeper (and more expensive) versions.

▲ A camouflaged HQ, such as this East German one in the woods of East Germany could be real or fake. Dummy HQs, often quite sophisticated, are an important element of Soviet deception planning, intended to mislead or delay NATO decision-making and present targets for attack.

- The concept of operational manoeuvre groups (OMGs) seems to have become an essential feature of contemporary Soviet operational planning (see C.N. Donnelly in *IDR* 9/1982 and C.J. Dick in *IDR* 6/1983). Surprise makes it much easier to insert major groupings into the enemy rear, thus prolonging the effects of surprise.

- By ensuring that there will be a series of meeting engagements, surprise lessens the logistic burden and the number of casualties in offensive operations. Soviet research shows that, in 1944-45, tank armies involved in fast-moving, manoeuvre warfare and advancing at 16-45km a day suffered only one-third the loss in men and two-thirds the tank losses (mostly easily repairable mechanical breakdowns) of tank armies advancing 4.5-13km a day. They also used only one-third the amount of fuel and one-fourth the quantity of ammunition of the armies involved in fighting through a prepared, balanced defense.

- It will be just as important for the USSR to surprise the Warsaw Pact as to catch NATO unawares. Otherwise, some reluctant Pact allies might attempt to opt out and leak Soviet intentions to the West. It would be as well to give the ordinary soldiers and populations of these allies little time to reflect on the need for and desirability of war.

A heavy blow

The weight of the blow must be great enough to carry it to the strategic objective (here postulated as the Rhine) in a single, non-stop offensive operation. Moreover, it must be delivered by the forces in place in peacetime, as a major mobilization and forward deployment would prejudice surprise. As Marshal V.D. Sokolovskii has written: "It is necessary to keep deployed in peacetime sufficient armed forces to reach at least the nearest strategic objectives before successive echelons are mobilized and sent into action...so that the main aims of the war can be attained in the initial period, without additional mobilization.... He who, right from the start, can get his troops deepest into enemy territory will be best able to exploit his nuclear strikes and prevent the enemy from mobilizing. This will be of great importance in Europe because distances are so small."[6]

Herein, doubtless, lies an explanation for the steady growth of the Group of Soviet Forces in Germany (GSFG), and the modernization of the East German Army. Over the last decade, the GSFG has expanded by approximately 10% in tanks, 20% in combat APCs/MICVs, 35% in artillery and over 50% in attack helicopters. These increases take into account the much publicised Brezhnev troop withdrawals of 1979, and the trend shows no sign of changing.

Speed and flexibility in the advance

- A high tempo of operations has a paralyzing effect on enemy commanders, who become disoriented when prevented from implementing long-prepared defensive plans and faced with uncertainty about the attacker's progress and intentions. They are limited to reacting belatedly to the latter's initiatives, making proper exploitation of his weaknesses impossible.

- The psychological impact of a rapid advance on enemy commanders, troops and civilians alike can quickly induce a climate of collapse, not least in that most important military objective of all, the minds of the enemy's political decision-makers. The Soviets believe that NATO, being an alliance of disparate, bourgeois states, riddled with disaffected groups and with no real cohesion under the surface, is prone to this sort of collapse.[7]

- Speedy progress can negate the enemy's nuclear weapons, reducing his decision-making time and making targeting difficult. Friendly and enemy units will become so intermingled that nuclear strikes will become impossible in many cases.

Simultaneous attacks throughout the enemy depth

The enemy must be attacked throughout his entire deployment. Much investment has been poured into Soviet forces for this purpose; the operational-tactical missile troops now being equipped with missiles accurate enough to deliver improved conventional munition (ICM) warheads effectively, long-range strike aviation, seven airborne divisions, at least eight air-assault brigades (a growth area) and many independent battalions, a massive special-purpose forces effort, as well as OMGs and forward and raiding detachments from the ground forces. Apart from spreading confusion and panic, these attacks in the enemy's depth have four principal missions:

1. The destruction, or at least disruption, of enemy nuclear delivery means and associated command, control and logistics.
2. The disruption of the enemy's command, control and communications.
3. The destruction and disruption of enemy air and air-defense forces as part of the counter-air operation.
4. The obstruction and delay of enemy reserve and troop redeployments and of the withdrawal of defeated enemy elements, as well as disruption of the logis-

tic system. In this way, if the defense crumbles from within, it will be possible to dispense with a strong second operational echelon, the mobilization of which would prejudice surprise and which is vulnerable to nuclear, or even conventional, interdiction.

Air superiority

This is an obvious precondition both for rapid advance and for deep operations. The counter-air operation has now assumed an importance almost equal to the ground operation, as has the air-defense operation. The type of aircraft being supplied to the modernized Soviet Air Force, its reorganization and its new operational concepts demonstrate the Soviet awareness of this point.

The possibilities of strategic surprise

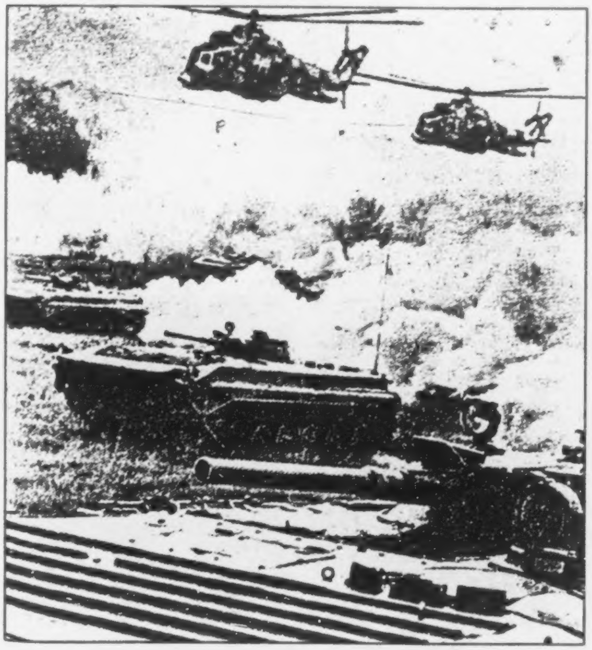
Strategic surprise is defined as concealment of the intention to launch an offensive and/or its timing.[8] It is achieved through "large-scale deceptive actions, regroupings and concentrations, concealing troops and installations, and misinforming the enemy."[9] Historically, the Soviets have been very successful in implementing such measures. Perhaps the most pertinent example is the war with Japan in 1945. The Japanese knew they were going to be attacked, but believed the blow would not fall before March 1946; they thought that the bad weather combined with the urgent Soviet need to increase force levels in the Far East would preclude an offensive in 1945, while the government was taken in by Soviet diplomatic deception.

The limits of modern surveillance

Many experts reject past examples of successful surprise as irrelevant, arguing that modern means of surveillance make surprise impossible. In doing so, they ignore three basic points.

1. If the aggressor's objective is a limited one, as has been postulated for the Soviets in a war with NATO, then his tell-tale preparations will be correspondingly small (given as high a level of peacetime preparedness as that of the GSFG and of selected non-Soviet Warsaw Pact formations).
2. Surveillance merely provides data. Technical progress in intelligence gathering has not made interpretation any easier nor lessened the possibilities for deception and disinformation. This is particularly important because the people that the Soviets have to surprise are NATO's political leaders, who will make the crucial decisions about mobilization and deployment. Political leaders, at least in a democracy, may be overly cautious, concerned that a hasty reaction could provoke the very war they wish to avoid.

▼ The Soviets would storm through NATO defenses in a surprise attack with BMPs and *Hind* attack helicopters. The very speed of their advance is expected to contribute to surprise as they plan to act before the defense can proceed from intelligence gathering to action.



3. Surprise does not have to be total to impart a substantial advantage to an aggressor. This is particularly true if the objective is a limited one and victory can be achieved before its effects have worn off.

It must be remembered that, while progress in the surveillance field has indeed amounted to a "transparency revolution", other technological advances have actually made surprise easier to achieve. The increased range of modern missiles and aircraft makes it possible to deliver a massive, deep, highly accurate blow (conventional as well as nuclear) without warning. The time required to move fully mechanized, combat-ready formations in the forward area from their peacetime garrisons to their deployment areas is now to be reckoned in hours, rather than the days or weeks that used to provide ample warning.

Moreover, the equipment, structures and training of many contemporary armies make it very difficult to distinguish between offensive and defensive preparations and exercises. This is particularly true if the potential aggressor is wont to use highly visible, large-scale military activity for the purpose of applying political pressure, or if he desensitizes the intended victim by accustoming him over time to a high level of military activity.

Thus, for example, the Egyptians made warlike preparations twenty times between January and October 1973 and actually cancelled three cross-canal attacks at the last minute because of Israeli counter-mobilizations; they would not have struck in October had the Israelis reacted then, but would have continued their game of cat and mouse until an occasion when their enemy remained supine.[10] In the Polish crisis of 1981, on the other hand, when Soviet and Warsaw Pact military preparations were undertaken which would normally have been considered alarming, NATO did not react because these preparations could be explained in terms of the Polish situation.[11]

Assessing intentions

Clearly, as war-like preparations can be made ambiguous, an assessment of an enemy's capability to attack is an insufficient basis on which to reach the decision to counter-mobilize. Such precipitous counter-mobilization could appear threatening to the enemy. At best, it would lead to a series of futile and expensive mobilizations which would soon [illegible] cover for the [illegible] October 1973). It is essential, therefore, to divine the enemy's intentions before preparing for war, and this puts a premium on political over military indicators.

● *Disinformation*: A major problem facing intelligence staffs in this effort is sorting genuine signals from the background "noise" in time. Before initiating preparations for war, NATO governments are going to demand very strong evidence of the USSR's intentions to attack. Given systematic Soviet deception and disinformation, intelligence will be unable to supply it. The Soviets will do everything they can to complicate and confuse the picture and it will be extremely difficult to penetrate a well prepared, long term disinformation plan. Analysts are therefore generally gloomy about the prospects of avoiding surprise at the outset of the next war.

● *Surprise in Europe*: It is worth noting that the Soviet Union has achieved strategic surprise, as to intention and/or timing, three times in recent history — in the 1968 invasion of Czechoslovakia, the 1979 occupation of Afghanistan and the 1981 events in Poland. If the Kremlin leaders cold bloodedly decided that an invasion of Western Europe was necessary, they would desensitize NATO, accustoming the alliance to a threatening military posture and level of preparedness, while using every available conduit to assure the West that war was unthinkable. They could then manufacture some crisis (such as Poland in 1981) as a cover for the final, unconcealable military preparations.

If, in a less likely scenario, there was no pre-conceived plan to go to war, but that decision was only taken during the course of a crisis, the Soviets would endeavour to convince the West that it was "just another crisis", solvable like all its predecessors. Surprise, at least as to timing [illegible]

[illegible]

It is easy to show in theory how a few days could give the Soviets a decisive edge over NATO, given the alliance's dependence on several days of preparation to establish a viable defense. SACEUR's intelligence staff may warn of the probability of attack for some time, but the doubts of many of NATO's leaders will delay the decision to institute countermeasures until it is too late. Thus, SACEUR is unlikely to be astonished when the Soviets move for it, but he is likely to be surprised in the military sense in that he will not have been allowed to deploy and prepare defenses in good time.

"It will be just as important for the USSR to surprise the Warsaw Pact as to catch NATO unawares."

Operational surprise

Operational surprise is defined by Major General Matsulenko as stemming from successful concealment of the timing, strength, direction and/or mode of the offensive.[18] Obviously, it will be most easily achieved if preceded by strategic surprise. Indeed, the two in combination can be devastating, particularly if the objective is limited.

Eight methods

Soviet sources insist that operational surprise can also be achieved on its own. [illegible] preparations [illegible] the offensive. Soviet Major General S.P. [illegible] states that "concealment of the true scale and especially the direction and timing of the main attack is a quite achievable task which should always occupy the centre of attention ... Innovative search in solving the problem of gaining the element of surprise in military operations is one of the most important tasks of military cadres."[19] He identifies eight ways in which operational surprise can be achieved:

1. By foregoing detailed preparations and attacking "from a flying start", surprise as to timing can be achieved. The Soviet invasion of Manchuria provides a good example. The Soviets launched a sudden onslaught with only a 1.2:1 superiority in men, 4.8:1 in tanks and artillery and 2.5:1 in aircraft — figures not too dissimilar to the force ratios pertaining in the Central Region today.

2. The enemy can be confused as to actual intentions by misleading behaviour, such as a low level of activity or obviously defensive preparations.

3. Attacking at an unlikely time usually catches the enemy badly off balance. In both the Manchurian and Vistula-Oder operations, for instance, the defense was caught off guard by the Soviets' decision to attack in unfavourable weather.

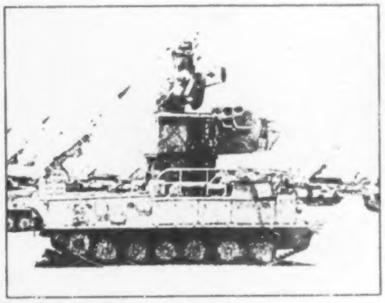
4. Time after time in history, an attacker has gained a decisive advantage by striking along an unexpected axis. During World War II, the Soviets often chose as their main axis terrain dismissed by the enemy as unsuitable for a major offensive; in Soviet eyes, the best terrain for tanks is any area where there are no enemy anti-tank weapons.

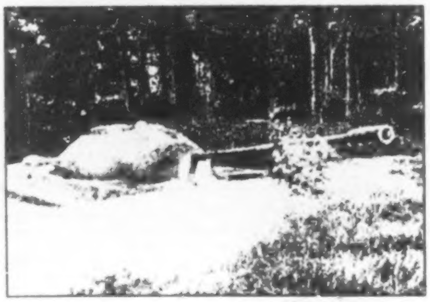
5. Unexpected operational methods can have a paralyzing effect on the enemy. The German blitzkrieg is the best known example. It is less commonly realised that the Soviets more than repaid them in their own coin with the imaginative use of "mobile groups".

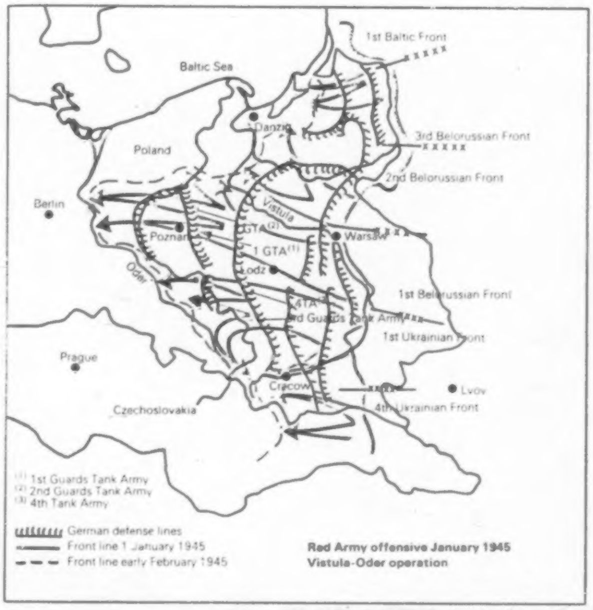
6. A considerable shock can be delivered by the unexpected employment on a large scale of new, or greatly improved, weapons. Soviet T-34s and *Katyushas*

◄▼ The Soviet [illegible] radar of an SA-6 battery. The Soviets are aware of the significance NATO attributes to the deployment of air defense radars and are likely to use emitters with distinctive signatures for deception purposes.

►▼ Over 1,000 dummy tanks were used in the World War II Vistula-Oder offensive operation. Modern dummies can be designed to emanate heat, light and electro-magnetic energy.







Red Army offensive January 1945
Vistula-Oder operation

came as an unpleasant technological surprise to the Wehrmacht, as did more recently (in 1973) the SA-6/ZSU-23-4 combination to the Israelis. Soviet writings lay great emphasis on the impact this aspect of surprise will have in the next war.

7. Strict security is, of course, essential for surprise, and Soviet secrecy is legendary. Their security was never penetrated by the Germans, but this was understandable. In the Vistula-Oder operation, which involved 2.2 million men, 34,500 guns and mortars, 6,500 tanks and SP artillery guns and 4,800 aircraft, only oral instructions were issued until D-day minus four, when only four written operation orders were issued.

8. The last method, deception, is so important that it will be treated separately.

Operational deception

Despite the "transparency revolution", Western armies remain vulnerable to operational level deception for three reasons.

- The overconfidence of some intelligence officers renders them fallible. This is especially true where oracular faith is placed in SIGINT, the most easily spoofed of all intelligence-gathering means.
- Closely related to the first point is the pronounced tendency to disparage Soviet operational flexibility. Soviet lack of tactical imagination is taken to imply a lack of operational imagination too, despite all the historical evidence to the contrary. Knowing this, the Soviets can tailor their deception to confirm the enemy view of their stereotyped practises. US forces may be particularly vulnerable to this, because of an often dubious picture of their enemy and because of AirLand Battle's reliance at times on templating the Soviet forces in the absence of hard intelligence.
- Modern war has seen a simultaneous massive increase in the volume of data available to intelligence staffs and a drastic shortening of the time available for analysis, dissemination and subsequent decision-making. This must increase the possibilities of surprise through deception. The Soviets will try to allow the enemy enough time to notice and act on their deception, but insufficient time to analyze the information in detail.

The mobility and flexibility of modern mechanized and air-mobile formations are such that the deception plan does not have to work for long. As with strategic deception, it does not have to be totally successful either. An ambiguous picture will often be enough to prevent the enemy from reacting in time. (It is also worth mentioning that the very nature of manoeuvre warfare, with its sudden, rapid and radical changes in the situation and frequent shifts of emphasis between axes will generate so much "noise" that, even without hostile deception to complicate matters, intelligence will have the greatest difficulty in divining enemy intentions.)

Examples of maskirovka

Soviet military writings use the term "maskirovka", an amalgam of concealment, camouflage, simulation and disinformation which combines security and deception. Though at unit and sub-unit levels, maskirovka may, because of time constraints, consist of little more than the use of dead ground, coupled with a misleading smoke concentration on a false axis, it can become very sophisticated at higher levels. During World War II, massive concentrations were achieved, totally undetected by the Germans (often in very bare terrain). Prior to the battle of Kursk, the Central Front alone was covertly reinforced by ten rifle divisions, seven tank regiments, 23 tank-destroyer brigades, over 9,000 guns and mortars and 1,300 aircraft.

In offensive operations, simulation took place on a grand scale. Thus, before the Vistula-Oder operation, over 1,000 dummy tanks and SP artillery guns were deployed with scores of real ones (to create tracks), and with the real communications nets of the 1st and 2nd Tank Armies, on a false axis; all the German intelligence combat indicators for each stage of an offensive in preparation were duly supplied. Meanwhile, the true concentration (on an axis through difficult terrain) was successfully disguised as a false one. The Soviets were also prepared to devote very substantial forces to feint attacks on false axes. For example, the 4th Guards and 5th Shock Armies were used in this way in the Iassi-Kishinev operation, as was the reinforced 36th Army in Manchuria. These troops, who took very heavy casualties, were not considered wasted. They were not only misleading the enemy, but also fixing enemy formations (and drawing in reserves) and killing enemy soldiers.

Deception is not a forgotten art, as it tends to be in the West. Rather it is stressed as a mandatory component of all strategic, operational and tactical plans. In fact, the Soviets have formed well-equipped specialist units at operational level purely to implement deception. Sophisticated modern surveillance techniques permit the design of dummies to emanate "heat, light and electro-magnetic energy."[14]

Tasks of maskirovka

Maskirovka is pervasive in Soviet military literature and has a myriad of uses, but in the operational sphere, eight basic tasks are listed:

1. Masking an increase in or redeployment of forces and/or weapons which the enemy has spotted.
2. Blocking the enemy's perception and/or identification of new weapons.

[illegible]
4. In high-intensity [illegible] overloading the enemy [illegible] analysis of capacity.
5. By presenting an illusion of strength where there is weakness [illegible] in an opponent or forcing his attention on an area where no real threat exists.
6. In a complementary fashion, luring the enemy into a false sense of security by presenting an image of weakness where there is really strength.
7. Accustoming the enemy to particular patterns of behaviour so that he does not recognize offensive preparations.
8. Confusing enemy expectations, leading him to misunderstand Soviet actions so that he fails to find the correct response to them.

"Before initiating preparations for war, NATO governments are going to demand very strong evidence of the USSR's intentions to attack. Given systematic Soviet deception and disinformation, intelligence will be unable to supply it."

Principles of deception

It is obviously impossible to list the ingredients of Soviet deception as one would for the recipe for a cake. The first principle, as Soviet writers never tire of reiterating, is creativity and originality: stereotype is fatal to any prospect of success. Scrupulous adherence to the following basic principles is also stressed:

a) Any deception plan must have a clearly defined aim which supports the real operational scheme. It must be directed at a specific target, usually the enemy commander, and be based on his known prejudices and likely reactions; ideally, it will confirm his preconceptions (as known, for instance, from a study of his training manuals and exercise play, from his reaction to previous moves and from the nature of his deployment).

b) Control is always exercised at the highest possible level. Otherwise, various uncoordinated lower level deception schemes can compromise each other, and the main plan, through revealing anomalies.

c) Preparation and execution must be thorough. Sufficient resources must be allocated to ensure credibility, and their activities constantly monitored to eliminate errors and breaches of security. There must be close co-ordination between the actual operational plan and the deception scheme (preferably passing the former off as the latter). Each stage of the deception scheme is implemented when it appears that the enemy has fallen for the previous one.

d) Credibility is, of course, a *sine qua non*. The deception plan must be a plausible alternative to the real one and it must unfold in logical and realistic fashion, feeding the enemy with the combat indicators he would expect to see, yet not so readily as to excite suspicion; the enemy intelligence must [illegible]

[illegible] patterns with [illegible]

e) It is essential to [illegible] of the enemy's intelligence [illegible] as possible [illegible] There must, too, be the correct mix of [illegible] and ambiguities. Timing is also important. Intelligence must be given enough time to collect and interpret the false information, but not enough for thorough analysis.

f) Flexibility in execution is a vital attribute of deception. Enemy reactions, both predicted and unforeseen, must dictate the unfolding of the plan; radical modifications may become necessary if, for instance, the enemy misses some signals, misinterprets some and does not buy others.

g) Security is as vital to the deception plan as it is to the operational one. It is easy to see why the Soviets insist that deception is an art requiring originality and flair. Those who have a stereotyped image of the Soviet military as lacking imagination would do well to remember that it was arguably the most successful practitioner of deception in World War II.

Conclusions

The current debate about improving NATO's conventional defense tends to concentrate on "bean counts" and the relative merits of rival items of hardware for scarce funds. Perhaps both military and political leaders need to spend more time on the intangibles, beginning with the problem of how to cope with the danger of surprise without, at the same time, running the risk of alarming the Soviets in period of crisis, or of giving them an excuse for pre-emptive action.

● *Field fortifications*. One useful measure, which could help to lessen the impact of surprise, might be the construction of a belt of field fortifications, manned by infantry, along the IGB. The Soviets have considerable respect, born of painful wartime experience, for a combination of anti-tank ditches, minefields and strong points in depth backed by strong, armoured reserves.[15] Such mobility denial would, in effect, act as a force multiplier for the defense, cancelling out the advantage surprise confers on the attacker. The Soviets would be forced to echelon their offensive forces in greater depth to ensure penetration. This would compel them either to deploy substantial extra formations, compromising surprise, or to plan a much weaker initial blow on a narrower front. In either case, NATO's task would be greatly simplified and the prospects of "deep strike" having worthwhile targets dramatically improved. All this would be achieved without impairing crisis stability, given the unambiguously defensive nature of such defenses.

● *Accepting surprise*. NATO's senior commanders would do well to plan on the basis that they will (not may) be the victims of strategic surprise. To count on several days for preparation is to confuse warning time, which may exist, with preparation time, which almost certainly will not. It is more than likely that little, if any, augmentation of force levels will be possible prior to hostilities, and obviously reinforcement schedules will be most unreliable in the face of Soviet deep attacks. As things stand at present, the Soviets will be able to impose their style of warfare on NATO. This means that the alliance will have to accept the inevitability of meeting engagements and battles. Western forces need to accept [illegible]

◆◆

Notes

[illegible]

[Whereupon, at 11:50 a.m. the subcommittee adjourned, subject to the call of the Chair.]

1464

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

FRIDAY, MARCH 14, 1986

U.S. Senate,
Subcommittee on Strategic
and Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

ICBM PROGRAM

The subcommittee met in open session pursuant to notice, at 9:08 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Thurmond, Cohen, Quayle, Wilson, Exon, Levin, and Glenn.

Also present: Senator Gore.

Staff present: Patrick A. Tucker, general counsel; Robert G. Bell, Robert F. Bott, Douglas R. Graham, William E. Hoehn, Jr., professional staff members; Colleen M. Getz and Russell C. Miller, research assistants; and Karen A. Love, staff assistant.

Also present: Romie L. Brownlee, assistant to Senator Warner; James M. Bodner, assistant to Senator Cohen; Henry D. Sokolski, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Allan W. Cameron, assistant to Senator Denton; Alan Ptak, assistant to Senator Gramm; Janne E. Nolan, assistant to Senator Hart; Jeffrey B. Subko, assistant to Senator Exon; John B. Keeley, assistant to Senator Levin; and Milton D. Beach, assistant to Senator Glenn.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. Good morning, ladies and gentlemen.

The subcommittee meets in open session this morning to receive testimony in support of the fiscal year 1987 budget request for the modernization of our land-based missile forces. This is the first of the subcommittee's hearings on the fiscal year 1987 budget request, and it is the desire of the ranking member, Mr. Hart, and myself that these hearings focus on the broad policy issues underlying the budget request rather than simply on budgetary detail.

Three years ago the distinguished Scowcroft Commission fashioned a roadmap for ICBM modernization. That roadmap, which is framed in an arms control context, included 100 MX missiles in existing Minuteman silos, a small single warhead ICBM, and then follow-on basing research. Today the MX Program is kept by the Congress at one-half the levels recommended by the Commission for the MX while the military requirement for warheads capable of effectively attacking hardened targets, which the Commission strongly endorsed, has not diminished.

While deployment of MX in existing Minuteman silos has been the focus of debate in recent years, that should not be the case this year. The 21 MX missiles contained in the budget request this year are in response to congressional language that MX production be continued at an efficient rate to provide missiles for testing.

These test missiles are essential to the operational commander's assessment of their effectiveness irrespective of the total number of missiles deployed, and thus are an essential element of the deterrent value of the system.

Moreover, so long as an open production line exists, the Nation preserves options to respond to changes in the threat or in the arms control environment or to take advantage of more survivable basing modes. Language drafted by the Senate last year left open the possibility of deploying more MX missiles if a survivable basing mode can be identified. This should not be surprising for at least two reasons.

First, there was bipartisan Senate support for the 200 MX missiles in multiple protective shelter basing during the Carter administration and in the current budget environment the substantial investment already made in the MX missile cannot be ignored. This subcommittee took an active role last year in seeking additional information on certain aspects of the small ICBM Program, especially the congressionally imposed weight constraint of 30,000 pounds.

At the time it was suggested that anything less than unquestioning support of the original small ICBM base line would fracture a fragile consensus for ICBM modernization and the triad concept. However, the small ICBM baseline that is emerging from questions that were raised by this committee appears to be more effective and affordable, and thus more likely to secure an enduring consensus than would have been the case otherwise.

It is the view of the Chair that prior to a commitment to any program that involves billions of taxpayers' dollars, there must be the most rigorous scrutiny of all alternatives. At the same time, once committed to a course, both the executive and the Congress must do a better job of staying that course.

To do otherwise, as both the Congress and the executive have done with the MX, results in the kind of cost growth that Dr. Hicks has detailed in his prepared testimony for today. To stay the course, on the other hand, results in programs like the B-1B, which is being delivered ahead of schedule and within cost.

The first of two reports requested by the committee has been received, and indicates that small ICBM missile weight can be increased to 37,000 to 40,000 pounds in order to provide greater payload flexibility, including provisions for penaids, without compromising the mobility or the planned availability of the system.

It also appears that there are cost and operational advantages in basing some or all of the small ICBM's at existing Minuteman bases. Today's hearing will provide an opportunity for the representatives of the Office of the Secretary of Defense and from the

Air Force to present testimony on these findings and possible program responses to them.

Other options for the small ICBM, including MIRV'd payloads, have been suggested that promise reductions in the cost of the program but would require restructuring of the program with a resulting slip in the congressionally mandated schedule. Again, we look to our witnesses this morning to shed light on these issues.

Given the cap on MX deployment in existing silos and the progress that has been made in the interim on the small ICBM and on the follow-on basing research, it would be very helpful if the administration turned itself to the task of an updated ICBM modernization roadmap that includes the Minuteman, MX, and the small ICBM.

This roadmap could provide the framework for congressional consideration of the fiscal year 1988 budget request.

Before we turn to our first witness this morning, I would like to remind my colleagues of the budgetary pressures that are likely to dominate our deliberations this year. To achieve savings within the subcommittee's jurisdiction, strategic modernization will be competing with the military space program, which after the *Challenger* tragedy will receive increased priority, chemical and theater nuclear force modernization, the Department of Energy's defense programs, and a large number of research and development activities.

Last year, programs within the jurisdiction of this subcommittee were reduced by over $3.4 billion during the authorization process alone. Reductions of that magnitude this year will force us to consider slowing the pace of such top priority programs as the Stealth bomber, the Trident II missile, the SDI, and the small ICBM. We will look to our hearings as the vehicle for obtaining the information that we will need in making our recommendations to the Senate as a whole and in stating our recommendations on the floor of the Senate.

With that by way of introduction, our first witness this morning is Dr. Donald A. Hicks, the Under Secretary of Defense for Research and Engineering. Dr. Hicks is responsible to the Secretary of Defense for the conduct of research and development programs, including the ICBM Program before us today.

Dr. Hicks is making his first appearance before this subcommittee, and I extend to him a very warm welcome.

It is the intent of the Chair to proceed with the testimony of our first witness followed by a round of questions limited to 5 minutes each, if that is agreeable. We will then turn to our second panel of Air Force witnesses and proceed in a similar manner. Adequate time will be provided today for all members to present their questions.

Dr. Hicks, before asking you to begin, I turn to my distinguished colleagues in the minority. I do not see Mr. Hart present today. Mr. Glenn, do you wish to make a statement on behalf of your side?

Senator **GLENN**. I have no statement, Mr. Chairman. Thank you.

Senator **WARNER**. All right. We welcome our colleague from Tennessee, Mr. Gore, who has had an active interest in this particular subject for many, many years.

Any other comments, gentlemen, before we proceed?

Senator **THURMOND**. Mr. Chairman, I will just submit my statement in the record.

[The prepared statement of Senator Thurmond follows:]

PREPARED STATEMENT OF SENATOR STROM THURMOND

Mr. Chairman, it is a pleasure to join you here today for this presentation on ICBM modernization, and I would like to add my welcome to Dr. Hicks, Dr. Cooper, General Randolph and General May. I look forward to your testimony.

Mr. Chairman, I am becoming more and more concerned with the Small ICBM program. The cost of this program will be tremendous, and with the cuts we will be forced to make in the defense budget this year, it may be prudent to slow this program down a good bit.

Although the Scowcroft Commission recommended proceeding with both MX and a small mobile ICBM, the costs may be prohibitive. The Strategic Defense Initiative and the Advanced Technology Bomber are critical programs, and I hope that we do not endanger their progress to protect a missile system whose value is dubious at best.

Thank you, Mr. Chairman.

Senator **WARNER**. I thank the Senator.

Dr. Hicks, will you proceed?

STATEMENT OF DR. DONALD A. HICKS, UNDER SECRETARY OF DEFENSE, RESEARCH AND ENGINEERING

Dr. **HICKS**. Thank you, Mr. Chairman, gentlemen.

As you know, our current ICBM modernization program consists of three parts, deployment of Peacekeeper missiles in Minuteman silos, development of the small ICBM in hard mobile launchers, and the continued study of survivable basing modes.

Before I proceed into a discussion of these three areas, I would like to make an observation that should be a consideration in the balance of our discussion. As Senator Warner said, and as you all know, in 1983 the Scowcroft Commission recommended, among other things, the deployment of 100 Peacekeeper missiles in existing Minuteman silos, the development of a small ICBM, and the continued study of survivable basing modes for ICBM's.

Had this program proceeded as recommended, we would be headed toward fulfilling the Nation's requirement for at least 1,500 modern land-based individual RV's. However, congressional restrictions on the Peacekeeper Program leave us far short of that requirement. If that requirement is valid, and I believe it is, then you in Congress and we in the administration need to be getting on with the business of determining the most efficient way to meet it.

The Peacekeeper in Minuteman silo program has been and continues to be a model of success. This program has been on schedule and on cost since its beginning. As of last Friday's test flight, the Peacekeeper Program is 11 for 11. At this time it looks like the operational missile may be 30 to 35 percent more accurate than the original development program goal. No flight test program in history has come close to this kind of success.

Similarly, the actual deployment program at F.E. Warren Air Force Base is off to a good start. Construction of the pacing support buildings was completed ahead of schedule. The first silo was deactivated and disassembly began in January. The first operational stage one motor arrived on site last week.

We are very confident that the first operational missile test site—pardon me, the first operational missile site will be tu over to the Strategic Air Command in September, and an initial operating capability of 10 missiles on alert will be achieved this December.

In contrast to these successes, the economic aspects of the program leave us little to be pleased about. This is especially true when economic production rates are again becoming a rallying cry of those who want to tell us in the Pentagon how to become better managers. We could not agree more. Economic production rates were a major thrust of the Department's Carlucci initiatives in 1981. Unfortunately, the figures I am about to relate to you are a perfect example of what happens when political expediency and fiscal shortsightedness transcend the basic economic principles.

In 1983, we told Congress that we would build the 223 missiles necessary to deploy 100 Peacekeepers for $21.5 billion. This was based on producing 12 missiles in 1984, 40 in 1985, and 48 in each year to completion. In 1984, Congress reduced our fiscal year 1985 request for 40 missiles to 21. The unit cost increased from $79.3 million per missile to $118.6 million per missile. Last year, our request for 48 missiles was reduced to 12, and the total program was capped at 50 missiles deployed in Minuteman silos.

This means that for fiscal year 1986 we are now paying $148 million for each Peacekeeper when we had planned to be paying $66 million. This year we have requested 21 missiles, because last year Congress directed that the fiscal year 1987 quantity be between 12 and 21, all test missiles. At 21, the unit price is $70.2 million. If you reduce the request to 12, the unit price will be $97.8 million.

If our original plan had remained in effect, the unit price for this year would have been $52.2 million. If we keep this up to buy out the rest of the program at 21 per year it will result in a total program cost of $20.6 billion. At 12 per year the cost rises to $23.5 billion.

In other words, we may now pay more to deploy 50 missiles than we would have paid to deploy 100 missiles. This cannot be the right answer, and I urge Congress to allow us to complete this program in an economically efficient manner.

Turning now to the small ICBM's in hard mobile launchers, first I want to emphasize that we have done and are continuing to do everything that Congress has requested on this program. My problem is that I do not think that is enough, and I will return to this subject later.

Again, what has been done has been done very well. We went to industry in the concept development phase, and we have combined their best ideas to define a concept within the limitations imposed by Congress. Simultaneously, we have had four contractors competitively designing solid rocket motors. The results of their test firings make it clear that the advances necessary to design a 30,000-pound missile with sufficient range have been achieved.

When we started this program, there were serious concerns about our ability to design a mobile launcher of sufficient hardness and about the practicality of testing such a vehicle. Our efforts in this area have resulted in two designs which appear to meet our requirements.

The Defense Nuclear Agency has made significant breakthroughs in defining the nuclear environments. These vehicles will be exposed to and in designing simulations which permit meaningful tests on the vehicles.

In summary, both the missile and the HML development are going very well, and we are very confident that we will be in a position to evaluate the system's readiness to enter full-scale development late this year. However, as I stated previously, I do not think enough is being done. As a result of the congressional language authorizing this program, all of our energies have been devoted to a single solution to our problem.

This emphasis may have been required to quickly establish the feasibility of the concept, and as I described earlier, the emphasis has resulted in a very successful program. However, as we approach a full scale development decision, we must ensure that we have considered the options necessary to make the right decision.

When the DSARC process was formalized to make major systems acquisitions decisions, one of its major objectives was to ensure that we never again begin the development of a new weapons system without doing the engineering tradeoff analysis necessary to examine all of the viable alternatives.

For the small ICBM, I do not believe we have the technical data to evaluate all the potentially viable alternatives. Common sense suggests, for example, that two- or three-warhead missiles should be cheaper per warhead than single-warhead missiles. What I do not believe we know, however, is the feasibility or cost of maintaining the same mobility with the larger missiles that we have achieved with the single-warhead missile.

The answer to this question is obviously critical with regard to the stability arguments that make a small missile appealing. If we can maintain essentially the same mobility, we can generate the same area. If we can generate the same land area, the Soviets have to use the same number of warheads to attack the area of dispersal. All we have done is to spend less money for missiles and launchers while charging the enemy the same price.

There were several if's in my discussion. My personal opinion is that the answer to these questions is positive, but I am not absolutely certain. What does appear certain is that no one, no one knows definitely. We need more data. Cost and stability are not the only criteria. Any major change in the program at DSARC will obviously perturb the schedule. Initial operational capability would probably be delayed, full operational capability very well might not be.

In fact, the actions of Congress on production rates is probably more important to obtaining full operational capability than the technical problems involved. Any negative effects of a perturbation must obviously be weighed. I hope that through our interchanges we will be able to reach a mutual understanding of the criteria we should use to evaluate the alternatives that face us.

My responsibilities require an evaluation of the alternatives, and we want to do everything we can to make the evaluation meaningful.

The third part of the technical portion of the modernization program challenged us to continue the search for more survivable basing modes. When we started this effort 3 years ago, we were looking at hardening silos and basing missiles deep underground.

In the last year we have added carry hard and shallow tunnels to the list. Most of the work to date has been on hardening silos, and the results have been impressive. We have absolutely proven that we can build silos 25 to 50 times harder than current silos.

Our original uncertainties concerning hardness phenomenology led to conservative designs and price tags that appeared to be prohibitive. With what we have now learned, we estimate that we could place 50 Peacekeepers in very hard silos for about $8 billion. There is no doubt that basing Peacekeepers in this manner is the cheapest way to improve the survivability of our land-based forces.

The question then becomes, how long would they remain survivable? This, of course, is a function of capabilities we attribute to the Soviets. Predictably, there is a wide range of opinion on this subject. The important thing is that we are concluding a very successful advanced development program this year, and are therefore in a position to enter full scale development in the future if we choose.

We have gone far enough with the deep underground program to conclude that it is a viable long-term secure reserve force alternative in the event that something unexpectedly should happen to our sea-based secure reserve force. We are continuing to work on life support and Command, Control and Communications Intelligence problems at a low level of effort, but have no plans at this time to enter full-scale development.

Carry hard and shallow tunnel basing modes are deceptive basing modes which offer another approach to making it prohibitively expensive for the Soviets to build the forces necessary to defeat the system. In this case unoccupied targets are provided to the Soviets. The trick of these systems is to ensure that the additional targets can be built at a lower cost than it costs the Soviets to attack them.

We do not yet know that we can do this. It looks promising, and we are conducting the tests and analysis to find out. We need your support for our funding request so that we can move ahead with our basing mode research.

In conclusion, I have described what we have accomplished and what we are going to do. We continue to believe that your support of this critical program is vital to our national security.

Thank you.

Senator WARNER. Thank you, Mr. Secretary.

Mr. Secretary, we had the opportunity to talk yesterday at some length, and this morning you have touched on a range of subjects that we covered. Your charter is, so to speak, chief scientist and developer of systems for the Department. But I presume you have an opportunity to discuss with your colleagues the arms control ramifications and other implications of these programs.

Dr. HICKS. Yes, sir, that is true.

Senator WARNER. To what extent does the Secretary of Defense—has he had an opportunity to focus on the various options that you pose with the Midgetman missile, and to what extent has he endorsed your thoughts that we should explore these various options?

Dr. HICKS. Before my first appearance before the House Armed Services Committee, I expressed my concerns to the Secretary that we really didn't have enough data upon which to make an appropriate judgment about whether we should proceed with full-scale development of the small ICBM, and since my responsibility to the Secretary and to you is to make sure that we have explored all the alternatives, I told him that I wanted to raise this issue before the committee, which I did.

I have also raised it before the Senate Appropriations Committee, as you know, where I was able to expand more on the thoughts. I do not have any preconceived ideas about this situation. I do know that if the mobility is not hurt, essentially in the process of going to a larger hard mobile launcher, then the survivability will be the same.

The issue of whether or not there is some perception that we are somehow more aggressive because we happen to have the MIRV'd missile rather than a single warhead I leave to others to consider in terms of the Soviets. I see no sign of the Soviets worrying much about that feeling, as far as we are concerned. The SS–25, for example, which we call a single warhead missile, has every weight capability of MIRV'ing to three reentry vehicles.

I really want to find the best way to get the 1,500 warheads that I believe we need land-based for a good deterrence in the strategic area, and at the least cost to the American people. If we can save any number of dollars, and I am saying I believe we can save a considerable number of dollars if this works out, I think we should explore the possibilities.

We also should remember here that the Scowcroft Commission felt quite comfortable with the issue of 1,500 warheads. We now are talking about 500 MX's based in Minuteman holes.

We have been capped unless we can find a better basing mode that the Congress approves having any more MX's. If we are going to reach—even if we build 500 small ICBM's initially and only have 500 MX's, we are going to have to build considerably more small ICBM's. That total program could cost $85 billion.

So anything we can do in the process here, either trying to preserve our options, low-cost options on the MX, or trying to save money if we are forced to go large numbers of small ICBM's, seems to me to be a prudent course.

Senator WARNER. To what extent are you receiving advice from outside panels on this?

Dr. HICKS. I receive advice from a lot of people.

Senator WARNER. I mean in a formalized way.

Dr. HICKS. In a formal way I will have a formal presentation by the Defense Science Board, DSB, panel on the ICBM issue. That will be probably within a week or two. It is in its final draft form. I have read the final DSB draft form and the Rand reports.

Senator WARNER. On the Defense Science Board, what conclusions do you anticipate they are going to reach?

Dr. HICKS. I hate to prejudge something before it comes out, because it was in rough draft form, and I always attempt not to interfere with the Defense Science Board and their evaluation.

My belief is——

Senator COHEN. Excuse me. Did the Defense Science Board approve the Deutsch panel report, still, though, being worked on by the panel members?

Dr. Hicks. I think what the Deutsch panel report will say is that there are a lot of uncertainties, the same uncertainties that I talked about today, but that they do believe we should proceed with the small ICBM Program, and that we should proceed with evaluating carry hard for MX missiles, and so on, that we should do all of the things that I have mentioned.

They say that we should proceed with the small ICBM. I cannot agree with that until after I have received and evaluated the data that I hope to get from the Air Force before the DSARC II. There will be, I am sure, comments by individual members of the panel after the report is released.

MX MISSILES

Senator Warner. What is the planned acquisition course for deploying 50 MX missiles in existing silos, and what would be the additional cost of deploying an additional 50 missiles in either existing or superhardened?

Dr. Hicks. Now, if we are talking about taking the second 50 MX——

Senator Warner. Clearly the costs today sunk in MX for 50, then costs for another 50 in a similar mode to what we are putting the current 50 in, and then the cost for 50 put in superhardened. I think you gave that as $8 billion.

Dr. Hicks. Yes, right.

Senator Warner. So I just wanted to get those three figures placed together in the record.

Dr. Hicks. The total for the 100 missiles in hard silos, superhard silos, what year is that?

Senator Warner. Let us step back now. You are putting 50 in the existing Minuteman silos today. So you take your total sunk cost in the program to date for these 50 missiles.

Dr. Hicks. If we buy them out at 48 per year, that is $19.1 billion.

Senator Warner. $19.1 billion for 50 existing Minutemen. Now, if you were to take a second 50, two options, put them in a comparable basing mode, what you are doing today, and then second, put them in superhardened.

Dr. Hicks. In the first case, it is $2 billion.

Senator Warner. $2 billion.

Dr. Hicks. Yes; the second case is of the order of the $8 billion we talked about earlier.

Senator Warner. Fine. Thank you. My time is up, gentlemen.

Senator Glenn.

Senator Glenn. Thank you, Mr. Chairman.

I think it is difficult sometimes when we get onto ICBM's and talking about ICBM's alone without considering our overall delivery force, the sub launched missiles and so on, because then we see what our real warmaking capability is, and to me the real Peacekeeper is the sub force, where we have 53 percent of—about 53 percent, I believe is the figure, of our deliverable nuclear warheads.

When we start looking at silo hardnesses and things—we are in open session, are we not, Mr. Chairman?

Senator Warner. Correct.

Senator GLENN. OK, so we may want to be careful with some of the figures here, and we may want to cover some of this later on in closed session. But you could comment in general on the accuracy we give on the new Soviet missiles, and I would also ask you, is it not true that we are beginning to see accuracies of the Soviets that will put any hardness that we make within the greater width of Soviet accuracy?

Dr. HICKS. I think I should not discuss that particular situation except to say that I think that right now that is not correct. What we are doing is exploring what we think they will do. We always, in terms of the Soviets, predict they are going to do what we will do in the long run. And so we have to, I think, when we build a basing mode, assume that they are going to be as good as we are at some point. Let us take the superhard silo. Eventually you could get accuracies good enough that the superhard silo by itself could not handle the problem for the reasons you pointed out.

I do not expect that to take place for some time. We cannot continually assume that the Soviets are going to be some place today that they will not be for some time, or we will always be building systems anticipating a threat that does not exist and will not exist for a considerable period.

One of the options we have in this particular situation, both for our deceptive mode and for the superhard silo mode, is terminal defense. We really have some good capability in this area, but we never discuss this issue.

Senator GLENN. OK, but I want to pursue the hardness issue. What you just said does not quite square with some of the other figures I had from other sources, and it is difficult to discuss this in open session, but one of the reasons I have not been a proponent of the MX and have been the biggest proponent on Capitol Hill, I think, for the mobile system for many, many years, going way back, is because as Soviet accuracies get better and we hunker down in tighter and tighter little holes, it becomes self-defeating in the long run.

Eventually they get the accuracies necessary to bounce these things, even if they are hardened. You can wind up with it tilted over, pointed at the next county instead of the Soviet Union, if you want to make light of it, but it just seemed to me that the old idea that Jimmy Carter had and so on of putting them in the mobile holes and things like that was the wrong way to go when we have such a tremendous, expansive Nation here, millions of square miles to deploy in, and can set up a mobile system that will give the best absolute guaranteed response. It is the nearest thing on land that is similar to our subsystem, and our submarines are maneuverable under water, three-dimensional to some extent, mainly two-dimensional, of course, but that is their big advantage.

And to go to a lesser system on land if we can do it is just not right, and the more we hunker down, whether it is in the Southwest or whether it is hardened holes, is the wrong direction, and I think we waste money in the long run by doing that. That is the reason I have not been a proponent of the MX. I am a proponent of a fast mobile, not limited to Southwest U.S. sites just so it makes everybody in the east feel good.

I know we all laugh at that, but that is the truth. When I went before the Townes Commission, there wasn't a single member of that panel who disagreed with me. I spent about 3 hours with them. There was not a single member that said that they did not feel it was a better deterrent at a cheaper cost, and could be built as a better deterrent at a cheaper cost, except that social interface.

Those were the magic words at that time, social interface. The American people would never accept it, yet we ask the Europeans to accept it, and they do, put missiles on the road. The Soviets do it with the SS-20, and somehow our people, even in the interests of survival, cannot somehow bear the thought of any missile coming down the road, even though it is safe.

I would not mind a missile going by some place at all, myself. Park it next to my house. I could not care less.

Dr. HICKS. Well, Senator——

Senator GLENN. The more we disperse, the more we hunker down, whether it is in southwest or hardened silos, the more we make ourselves more vulnerable as Soviet accuracies increase, and we could go into executive session and get some of the accuracy figures, but the figures I have are showing that we are getting to that point already.

Dr. HICKS. Well, we are not there, and we will not be for some time, but the point is that I do not——

Senator GLENN. I would question that. I do not just say that. I have got other figures that came from your shop over there.

Mr. HICKS. In closed session we had better talk about that.

Senator GLENN. All right. Good.

Mr. HICKS. First of all, I do not argue against mobility. I am not arguing about that issue. I think one thing you said that is not right, and that is lower cost. Mobility does not promote lower cost.

Senator GLENN. No, if you go with the hard turtle where you put half your expense in the mobility—if you go with a Safeway truck type operation it becomes much cheaper.

Mr. HICKS. Everything is cheaper as it becomes more vulnerable. Yes.

Senator GLENN. But as you spread out, your vulnerability decreases then, so do you want your vulnerability in hardness or in dispersion? That is the question.

Mr. HICKS. Then you have the problems of maintaining security and related costs. There are a lot of issues. I do not have to tell you that. You know it as well as I do. It is not a simple solution, not a simple answer. I am not attacking mobility per se. What I am saying here is that we need to have data to see what we should do and what we should trade off. The issue, I think, where I disagree with you in terms of the MX situation is that the MX is a formidable offensive weapon, and from that standpoint a formidable deterrent. The Soviet Union, in order to stop that, must consider a first-strike situation, and if they do decide on a first-strike situation, they have probably concluded that they will succeed.

Senator GLENN. My time is up, but coming right along with this, of course, are the accuracies of the C-4's beginning to get in, and the D-5 will have, and those accuracies are mobile accuracies and are the type of accuracies that we can get with land-based also.

Mr. HICKS. Absolutely.

Senator **Glenn**. And when you get that, we have the same hard target kill capability that we have got with the MX.

Dr. **Hicks**. No question. There is not a question in my mind about the capability of the small ICBM to hit hard targets.

Senator **Glenn**. My time is more than up, Mr. Chairman.

Senator **Warner**. Senator Cohen.

Senator **Cohen**. Thank you, Mr. Chairman.

HARDENED MOBILE LAUNCHER [HML]

Dr. Hicks, do you agree with the Secretary of Defense's report that was delivered to us on February 18? He said it is important to keep the gross weight of the hardened mobile launcher [HML] low enough to ensure successful mobile basing without restrictions. That is, road and bridge vehicular constraints. Do you agree with that?

Dr. **Hicks**. I agree it is important to do that, right.

Senator **Cohen**. The weights of the representative HML configurations to accommodate a 30,000-pound missile are estimated to range from 150,000 to 175,000 pounds. It is estimated that a vehicle weight must be kept below 200,000 to ensure successful mobile basing without restrictions, again road and bridge vehicular constraints. Do you agree with that?

Dr. **Hicks**. No.

Senator **Cohen**. OK. In another report to the Armed Services Committee—this is an Air Force report again delivered by the Secretary of Defense. He states in unclassified form that a 75,000-pound missile could deliver three Mark 21 RV's plus the penetration aids decoy package, and that a 75,000-pound missile would require HML weight of at least 230,000 pounds. Do you disagree with that?

Dr. **Hicks**. I think that is probably right, but again, I want to point out, we do not have the data yet.

Senator **Cohen**. Well, this is the Air Force's report.

Dr. **Hicks**. I understand.

Senator **Cohen**. They do not submit statements to you, do they, or to the Secretary of Defense without data?

Dr. **Hicks**. They have some data. They themselves will say they need more data. The fact is that any report is subject to how much data you have. The Air Force does not have enough data. They have not looked at all the sites involved. They will tell you this afternoon they do not know what the various sites will give them in terms of——

Senator **Cohen**. All right.

Dr. **Hicks**. Also, by the way——

Senator **Cohen**. The statement is wrong then. For them to make a statement——

Dr. **Hicks**. The statement is something that is supported by the data they have now. They just do not have all the data they need.

Senator **Cohen**. Let me just deal with the statement itself, and see whether you disagree or not. The vehicle weight must be kept below 200,000 pounds to ensure successful mobile basing without restrictions. Do you disagree with that?

Dr. **Hicks**. I disagree with that, unless you say what restrictions.

Senator COHEN. And you disagree then with the estimation that a 75,000-pound missile could deliver three Mark 21 RV's plus penetration aid, and that a 75,000-pound missile would require a HML weight of at least 230,000 pounds.

Dr. HICKS. I think that is about right, but I say, we do not have the data yet.

Senator COHEN. That is without data then.

Dr. HICKS. That is without detailed data. That is what the people who are exploring the stuff and——

Senator COHEN. OK.

Dr. HICKS [continuing]. Have not really optimized the configuration engineeringwise.

Senator COHEN. Now, you have indicated that the Deutsch panel has reported to the Defense Science Board. All right?

Dr. HICKS. That is correct.

Senator COHEN. My understanding is that the Defense Science Board has signed off, with a cover letter they have approved the findings and the recommendations of the Deutsch panel unanimously.

Dr. HICKS. You have to read the letter very carefully. The letter says that they believe that the approach taken by the Deutsch task force was appropriate. They did not say that the Department of Defense considers the findings of the Defense Science Board correct.

Senator COHEN. Were there any dissents?

Dr. HICKS. Pardon me?

Senator COHEN. Were there any dissenting opinions?

Dr. HICKS. There are some, there are dissenting opinions on parts of the findings. Absolutely.

Senator COHEN. The Defense Science Board members have dissented——

Dr. HICKS. There are people on the Defense Science Board that I will be glad to have come talk to you that say there are parts of the report, which is not out yet, so it might be changed, that they do not agree with.

Senator COHEN. When do we get the report?

Dr. HICKS. Probably within another week.

Senator COHEN. Because it was due prior to the submission of the 1987 budget.

Dr. HICKS. I know it was. There has been a lot of work done on that panel trying to get a more uniform acceptance of the report.

Senator COHEN. So we will have it by next week?

Dr. HICKS. I hope so. That is right.

Senator COHEN. You state on page 11 that two of the four HML concept definition competitors would be selected to continue the competition to the pre-FSD phase. There were two left out of four?

Dr. HICKS. Actually, there are three. There is still a hard—the hard, superhard silo is still involved. We have a lot of data on that. We do not think we need much more on that. The two that we really need a lot of data on are carry hard and the shallow tunnel.

Senator COHEN. Who are the contractors involved in that?

Dr. HICKS. I cannot tell you.

Senator COHEN. Could you supply it for the record?

Dr. HICKS. I have just been told that they are Boeing and Martin Marietta Corporations.

Senator COHEN. And who are the other two that were involved?

Dr. HICKS. Pardon?

Senator COHEN. You said there were four, I think.

Dr. HICKS. I do not know that there are four contractors.

Senator COHEN. There were only four contractors originally? There are two now?

Dr. HICKS. I do not know.

Senator COHEN. Do your aides know that?

Dr. HICKS. You are talking about the HML?

Senator COHEN. Yes.

Dr. HICKS. I do not know the answer. I recommend that you ask the Air Force this afternoon.

Senator COHEN. My time is up, Mr. Chairman. Thank you.

Senator WARNER. Thank you. We will go a second round.

Senator Wilson.

Senator WILSON. Thank you, Mr. Chairman.

Dr. Hicks, your language, I think, is refreshingly unambiguous, and what you are urging us to do, we as a nation, is to ensure that we never again begin the development of a new weapons system without doing the engineering tradeoff analysis necessary to examine all the viable alternatives.

Mr. Chairman, I would point out that the wisdom of that statement is echoed in earlier admonitions and observations contained in the Scowcroft Commission report. I think it might be worth a moment to refresh the recollection of those of us who are here this morning.

At the very first page of the report, there is the comment made that there are elements of the small missile program which warrant continued high level review such as missile size, guidance, initial flight test data, and overall system cost.

At page 15, and this is not a direct quote, but it is, I think—yes it is,

> Decisions about such a small missile and basing will be influenced by several potential developments, the evolution of Soviet strategic programs, the path of arms control negotiations and agreements, general trends in technology, the cost of the program, operational considerations and results of our own research on specific basing modes.

I think that indicates that the general support for the concept of mobility as a way of achieving survivability and stability existed at the time the Scowcroft Commission was making their recommendations, but with the obvious admonition that there was much that we did not know, and much that we needed to determine.

I note that in the analysis, the rather extensive analysis recently published by Congressman Aspin, Chairman Aspin, who I think is someone that we can acknowledge has been a great proponent of the small missile, there are comments to the effect that MIRV'ing the small missile in his judgment really is a consideration that does not affect survivability.

In other words, whether you have more single warhead missiles or fewer launchers that are MIRV'd, the price to attack would be essentially the same, and the survivability would be the same. So not arguing that, the argument that he makes against going to the MIRV'ing of a small missile is based on the sole consideration that we dare not take another year to engage in the kind of engineering analysis that you are counseling us to make this morning before we plunge ahead into full-scale development.

I would be interested in your response, Dr. Hicks, to the concern that the window of vulnerability has been open too long, and another year is going to be a fatal error. I note that you have said that you think that the time required to get the additional data that you are seeking would, while delaying the IOC, very likely not delay the FOC.

Dr. HICKS. Yes; that is my belief. I am not even sure at this point until we get through going through the data and see what changes we would recommend that would have an impact on the IOC. We will not know that until we have the data, make an analysis and come up with conclusions.

I would hope it would not, but I do not have any particular belief that if we are going to save a considerable amount of money, and we have to delay the IOC by a year, that that is such a big tragedy. I think it is important to consider our overall objective and commitment, and make certain it is the right choice. Hopefully, that will cause no delay, but whatever delay it takes in the time of a year to me would not be a big problem.

If it turns out that the modifications are small, there probably will be no delay at all.

Senator WILSON. Mr. Chairman, I will save my second question for the second round. I would just point out in passing, though, that again I think the Scowcroft Commission must have expected the kind of wise concern that has been expressed by Dr. Hicks this morning, because they specifically counsel at page 15 that the program should not be burdened with the uncertainties accompanying a crash program.

I think that is wise counsel.

Senator WARNER. I would interject one question, and then we will go to Mr. Levin.

PRICE AMENDMENT

Dr. Hicks, let us turn to the Price amendment for a moment. What is the administration's view with respect to the need for change in that amendment in order to prepare for the DSARC in 1986, December?

Dr. HICKS. Well, I think everyone now on both sides of the issues agrees that we have to at least expand the weight of the missile from 37,000 to 40,000 pounds to give us better reentry capabilities on the other end. The initial calculations show that that certainly would have no effect on mobility whatsoever.

I believe we have to have restrictions removed completely if we are going to do a good job on the DSARC. We really want to be able to look at things in the 37,000- to 40,000-pound class first, the 50,000-pound class and the 70,000- to 75,000-pound class. Those are the kinds of alternatives that a good look will be important to do. When we get through that, we will look at the effectiveness, the mobility changes and the cost issues, and then we will have the data required to consider alternatives and trades. In fact, we will be happy to come to you as these trades are being made this year to let you know how they are going, but when we finish the trades, which I have asked the Air Force to do, and I believe they can gather the data by December, we will then be able to decide what is the best course from those various alternatives. So I would like to have the restrictions removed so that we would have the freedom to look at everything.

Senator **Warner**. Well, I would hope that before this subcommittee concludes its hearings, that the Department of Defense would come forward with a draft of such amendment so that we know precisely the Secretary of Defense's and your views on this. But I presume from your answer that you would also want to sever this linkage with the MX Program, too?

Dr. **Hicks**. Well, there certainly is a linkage because of the number of hard target killers we need, and I believe that to be 1,500 land-based warheads.

Senator **Warner**. I am talking about the linkage in the timing, the milestones and the like. I am reading the Price amendment here. I will not take up the time, but it is obvious, I think, that that will have to be dealt with if we go ahead with the course of action recommended by yourself.

Now, Mr. Levin.

Senator **Levin**. Thank you, Mr. Chairman.

MX COST ISSUE

My first set of questions is on the MX cost issue, and you have gone through the costs and indicated that the way we are buying them it is going to cost more to buy 50 than it would have been to buy 100.

Is that because of the way in which we are spreading out the purchase of that 50 basically?

Dr. **Hicks**. Yes; it is a function of having overhead absorbed by fewer numbers, and also the lack of efficiencies in the production line itself. Those are the two basic reasons for it.

Senator **Levin**. But if we had stretched out the buy of 100——

Dr. **Hicks**. Then it would still be the same problem.

Senator **Levin**. We would have the same problem.

Dr. **Hicks**. Surely.

Senator **Levin**. So it is not the fact that we are buying 50, it is the way we are buying the 50. Is that right?

Dr. **Hicks**. That is it. You bought 50, it costs you so much money. You could have decided to do it faster and bought 100 for the same price.

Senator **Levin**. Now, if we had bought 200 instead of 100, but bought them in a much shorter period of time than we had originally planned to buy the 100, it might have cost us less to buy 200 than 100?

Dr. **Hicks**. I doubt it, because at some point you have a problem with your manufacturing capability to handle that kind of flow, and I think in this case we could not have raised—the facilities did not exist, and frankly, Senator Levin, I would have to look into the details of that, but it is my belief that the facilities just did not exist to have that kind of a rate, so you could not have done it.

Senator **Levin**. Is it possible, though, that we could have bought, for instance, 125 cheaper than 100 if we had purchased the 125 a lot faster than you proposed to buy the 100?

Dr. **Hicks**. It is possible, depending upon how much facilitization was made in the first place, and I cannot give you an accurate answer because I do not know the details of that.

Senator **Levin**. I understand that, but it is possible that it would have been cheaper?

Dr. **Hicks**. It is certainly a possibility. You would have to look at the situations of efficiency; you may have to have a whole new factory, for example. Where is the break point there? It is a complicated question. The fact of the matter is that there was a decision made to build MX at a certain schedule, and it was facilitized for that schedule, and when you do not meet that schedule, then you do not write them off the way you ordinarily do.

Senator **Levin**. I understand your testimony. What I am trying to do is make the point clear, which I think you have, that it is at least possible we could have bought 125 cheaper than you proposed us to buy the 100 if we bought the 125 more quickly. I am not saying it would have been. I am saying it is possible that it would have been.

Dr. **Hicks**. The situation could have existed that it would have been possible, yes.

Senator **Levin**. And if in fact that possibility is accurate, your assessment can tell us whether or not that would have been true, then someone could have charged you with buying 100 when it would have been cheaper to buy 125. I think that is about the same depth of the argument that you are making here today, which is that we could have bought 100 at your rate cheaper than we are buying 50 at our rate.

But I do not want to keep beating that point, because I think it is obvious from the testimony that it is at least a possibility. What I take great umbrage at, I must tell you, are the words "political expediency." Do you think the decision to buy 50 rather than 100 was political expediency?

Dr. **Hicks**. I talk about political expediency. I say anything that is done over here, the decisions that are made are political, and if that is not the most efficient way of doing it, then I do not know how else to call it.

Senator **Levin**. Well, now, if it would have been cheaper to buy 125 at a faster rate than 100, would we have charged you with political expediency in buying the 100 instead of the 125?

Dr. **Hicks**. I had hoped not to get into a sophistic argument here, but let me say——

Senator **Levin**. Well, when you use words like "political expediency" for decisions that you do not like on buying rates you sort of open up a real can around here.

Dr. **Hicks**. Let us talk about planning and carrying out plans.

Senator **Levin**. Let us talk about your rhetoric of political expediency for judgments that you do not like. Is that the way you label all judgments that you disagree with, as political expediency?

Dr. **Hicks**. I had not thought of that, but I think there are a lot of things I do not like that I do not call political expediency.

Senator LEVIN. But the MX decision by Congress was a politically expedient decision, not one that was based on a best judgment as to what was, in the wisdom of this country, in the security interest of this country?

Dr. HICKS. That would be my perception, yes.

Senator LEVIN. Is that the administration's position, too?

Dr. HICKS. I have no idea.

Senator LEVIN. OK.

Dr. HICKS. May I go back to something you said?

Senator LEVIN. Sure.

Dr. HICKS. Because I do not want it to lay on the table, your arguments, which I think are not valid arguments, Senator.

When you decide to manufacture something to meet a military requirement, and this is all before my time, but I am talking in a generic proper way to do things, and you decide when you want it to meet certain requirements, you then have a plan that lays out how it is going to be developed, how it is going to be manufactured, and what its rate is going to be, the rate to build that system.

When you do that, and you make those plans, you have factories, you have tooling, you have things that you have to do that allow you to build it at that rate and that time, and that starts the program, and that is the way the MX was started.

Now, when you have all of those capital assets in being, and you do not use them, when you take that overhead and you do not use it in the appropriate way——

Senator COHEN. When you terminated the mobile basing mode in 1980.

Dr. HICKS [continuing]. Then, you in fact have not used the capital equipment that you had, and you are inefficient. Now, when you use the capital equipment that you have to the fullest extent of your plans, then you are going to get the rate you should have.

I said that if we had used the capital equipment that we had available to us based on the original MX plans, and bought the MX missile at the rate we discussed, we could have had 100 missiles for the price of 50. It is just that simple.

Senator LEVIN. My time is up, but there are dozens of systems that we are buying at less than an economically efficient rate. Systems that you are proposing, as a matter of fact, that we buy at less than the efficient rate because of fiscal constraints. My time is up.

Senator WARNER. Senator Quayle, would you like to go now?

Senator QUAYLE. I will yield to Senator Wilson.

Senator WARNER. I think Senator Wilson has had his opportunity. I invite Senator Gore to join us here. If you would like to proceed now.

Senator QUAYLE. Dr. Hicks, I am sorry I arrived late. I was trying to catch up here.

Senator WARNER. Would you like to have Senator Gore proceed and then come back to you?

Senator QUAYLE. We have 5 minutes?

Senator WARNER. Yes.

Senator QUAYLE. Go ahead.

SINGLE WARHEAD MISSILE

Senator GORE. Mr. Chairman, first of all, let me again thank you for your courtesy and that of the subcommittee in allowing me to participate this morning. Secretary Hicks, I was pleased to hear your statement that in spite of earlier uncertainty about whether a 30,000-pound single warhead missile to fulfill the role planned for the small ICBM, despite earlier uncertainty about whether that was possible, you now think that uncertainty is removed?

Dr. HICKS. Yes.

Senator GORE. And you state that it is now clear that we can do it, and there is really no longer any doubt about that, and you say that both the missile and the hard mobile launcher development are going very well. So I am delighted to hear that, and I believe you have stated in front of other committees that the administration as a whole still strongly supports its commitment to proceed with the development of a single warhead missile, and the misgivings which you state about whether or not it should be MIRV'ed are really personal views. Is that correct?

Dr. HICKS. Well, I think they are not just personal views. A lot of people in the administration agree with me.

Senator GORE. But they do not represent the view of the administration, do they?

Dr. HICKS. The administration's position is that they are supporting a small ICBM development. I do not believe, Senator, that we can say that we know exactly what form that small ICBM should take.

Senator GORE. Secretary Hicks, I am not asking that question. I am just asking you to confirm once again that your view that we should perhaps MIRV the small ICBM is different from the official view of the administration. Is that not correct? I mean, officially the administration is still strongly in support of proceeding with the development of a single warhead mobile missile. Correct?

Dr. HICKS. I think that is right. They are also strongly in favor of and support my approach, which is to try to look at other alternatives to see if there are better ways to do that job. If it turns out that the small ICBM single warhead missile is in fact the appropriate one, then we have not lost any time. If it turns out it is not, then I am sure that come next December we will be able to find a way to get the administration to change its position.

Senator GORE. Well, we will see, will we not?

You say in your statement, if we can maintain the same mobility with a MIRV'ed missile, then it would be just as survivable. That is a big if. But leaving aside for the moment the question of how many RV's should be on the missile, do you accept the concept of Price to attack as outlined in the SECDEF report of last November?

Dr. HICKS. Yes.

Senator GORE. All right. This means that you believe we can deploy a force which the Soviets cannot destroy without a disproportionate commitment of resources to be targeted on one of our systems, correct?

Dr. HICKS. Yes, I have no problem with the mobile concept.

Senator Gore. Now, do you also accept that such a system is relatively immune to certain changes in Soviet forces such as increased fractionization and increased accuracy?

Dr. Hicks. That is correct.

Senator Gore. All right, so the implications are in my view that this system really affords us the opportunity to achieve our long-sought goal of building a relatively invulnerable counterforce land-based system. Do you agree with that?

Dr. Hicks. I agree it is an approach, but that I want to have a caveat for it, though, and that caveat, which I am sure you will see in the Defense Science Board's report, is that we have to make the assumption that the Soviets will not be able to come up with the capability of eventually spotting those missiles, those hard mobile launchers, and in fact targeting them.

Senator Gore. All right. Now, let me ask you another question. I wish I had time to explore that in depth. Perhaps we will later. If we adopt your personal view and delay the missile, let us suppose that we delay it, and for some reason opinion shifts to your view, and we adopt a concept of, say, a 75,000-pound missile. If we did that, would the contracts have to be relet? I mean, it would be a substantial change. Would we have to go through a new competition for the contract?

Dr. Hicks. I would think, Senator, that if we go over the 40,000-pound size, which I think could be considered probably a reasonable change to the existing contracts, we would probably have to recompete at some level. Now, it would not be an all-out competition.

Senator Gore. So contractors that lost out in the first round would have another bite at the apple, and we would have a whole new competition, correct?

Dr. Hicks. I would have to have you ask the Air Force that question. I am not sure that is true.

Senator Gore. Then they might be very pleased to see a year's delay and a brand new contract competition, if they lost the first contract.

Dr. Hicks. It sounds reasonable.

Senator Gore. Thank you for your courtesy, Mr. Chairman.

Dr. Hicks. May I answer one other thing?

Senator Warner. You can clarify any answer, and also, if I understood the Senator, his question was to a 70,000 pound, and you replied to a 40. I think I caught that.

Dr. Hicks. Well, let me——

Senator Gore. I am satisfied with his answer, Mr. Chairman. I gave the hypothetical of 75,000, but he said even above a 40 would require a new competition.

Dr. Hicks. I said might. I am not certain. But let me make a point, so we do not get the wrong words here again. The 70,000-pound missile is not my missile. The 40,000-pound missile, the 50,000-pound missile, or the 37,000-pound, they are not my missiles. What I am saying is, we have to have data to properly interpret what is the best solution for the cost, and what that data says when we get through, that will be my missile. So do not say that the 75,000 pound is my missile. It might be. It might not be, depending upon what we find this year as we proceed down that technical path.

Senator **Warner**. Let me see if I can summarize what has rapidly become the critical point, I think, at this hearing, and it is, the administration is committed to a mobile ICBM program. At this time, however, the administration is committed to looking at all options?

Dr. **Hicks**. Right.

Senator **Warner**. And that is about it?

Dr. **Hicks**. That is it.

Senator Quayle.

Senator **Quayle**. Thank you, Mr. Chairman.

Let me just proceed on this weight question. There seems to be a great interest in whether it is going to be 70,000, 60,000, whatever it may be. Is it not true that if we really gear up on accuracy, and we can have more reliability on the accuracy, that the weight problem may resolve itself? In other words, if we can get more accuracy, the weight we would have to have on this missile. Is there any——

Dr. **Hicks**. No; that will not really have any bearing on it, Senator. The accuracy issue of the missiles that we are talking about is not a problem. We are convinced that with the mobile missile we can achieve accuracies essentially the same as we can with the missile in the silo.

You have to have power, and you have to have various things like that, but that is all something that is workable.

Senator **Quayle**. Are there not ways to improve accuracy for both?

Dr. **Hicks**. I am not sure that I understand.

Senator **Quayle**. I guess obviously the yield would be much less if you have more accuracy; right?

Dr. **Hicks**. I see what you are saying.

Senator **Quayle**. If you have less yield and more accuracy, then you have less weight.

Dr. **Hicks**. I now understand your question.

Senator **Quayle**. Is there not a direct tradeoff here?

Dr. **Hicks**. As a matter of fact, interestingly enough——

Senator **Quayle**. And that might resolve some of these questions as to whether it is 70,000, 65,000, or whatever.

Dr. **Hicks**. Let me point out another possibility which has not been brought up.

Senator **Quayle**. Is this not a tradeoff?

Dr. **Hicks**. Certainly, it is absolutely a tradeoff. I think we are doing very well and will continue to do very well on accuracy. The issue that is interesting that you brought up is that we could have the ability to design a new RV, a new entry vehicle with about the same yield with less weight.

We know it is technically possible to do that now, so we could in fact MIRV in that case; that is, have more than one reentry vehicle for less weight than if we used the Mark 21, which is the reentry vehicle we are now planning to use. There are a lot of alternative solutions here that lend themselves to discussion, that have to be carefully looked at this year.

Senator **Quayle**. I would just be curious, and maybe we can follow this up at a later time, what specifically you are doing on additional improved accuracy.

Dr. HICKS. That continues on as a program that is independent of what missile we are going to use, and it continues to be pressed, and we are doing very well in the accuracy area.

Senator QUAYLE. All right. What about the possibility of earth penetrators?

Dr. HICKS. Earth penetrators, of course, add more weight, and that is another reason you would like to have more throw-weight, so that has to also be considered as we are discussing the kinds of targets we want to go after. I do not think that has been a very important consideration either in the present design, the present 30,000-pound design.

When I said that we have the ability, which we did not know we would have, to toss the RV, the Mark 21 far enough with a 30,000-pound missile, I do not say that that is the optimum situation. It does not have penaids with it. It does not have the things that make you feel that you could really do the job, but it is possible to get the RV at given ranges we want to cover in the Soviet Union.

Senator QUAYLE. Maybe you have already answered this question before. Have you given us any cost comparison of the single warhead versus the MIRV'ed?

Dr. HICKS. I have, but I am not really very proud of them. They came out of our Rand report, which again I believe that there is not quite enough data. You can get numbers anywhere from $10 to $20-billion if you had a three RV nose cone in a mobile situation.

It is going to be a major savings if we can do it. If we can maintain the mobility and have more than one RV, it will in fact be a major savings. The details of that savings we will have to work out this year.

Senator QUAYLE. Well, as you consider these other options, and I think the Chairman identified them right, you are pursuing a mobile ICBM, but you are still on hold as to what that mobile ICBM is going to look like.

Dr. HICKS. That is correct.

Senator QUAYLE. What will be the considerations from going to what the past Congresses have urged basically on the administration on the single warhead as compared to the MIRV'ed missile, and perhaps as many as three warheads?

Dr. HICKS. Right now we are under direction from Congress, and it is in our budget as directed by Congress, and we are proceeding with the 30,000-pound missile. That is in the program, and the contracts are going ahead, and things are moving ahead, and constituencies are being built everywhere. But at the same time I have been assured by the Secretary and by the National Security Council that they certainly agree with my desire to move ahead and look at the alternatives that could in fact give us the same capability, the same kind of survivability, and save the country money.

I find it difficult that anyone could be against that particular part of the program. If you get to a point where you find a different program that saves money for the country, and you say it might delay the program a year, then you have another tradeoff to consider.

My evaluation of that tradeoff would be that if we could save even $10 billion in this program by MIRV'ing, and save $10 billion in the program, I would certainly believe that a year delay in the IOC would be worth it.

Senator QUAYLE. Is cost driving your search for other alternatives.

Dr. HICKS. Absolutely, cost.

Senator WARNER. Gentlemen of the committee, Mr. Wilson has to go to the floor for the purpose of submitting an amendment. Mr, Exon, would you defer to our colleague?

Senator EXON. I would be glad to yield.

Senator WARNER. Let him have his second round of questions.

Senator WILSON. Thank you very much, Mr. Chairman. I appreciate the courtesy and indulgence of my colleague. Let me just ask Dr. Hicks, at the outset you made reference to the fact that the administration officially supports the recommendations of the Scowcroft Commission, and you indicated that it was your own belief as well as the administration's that the goal of achieving 1,500 warheads remains a valid goal if we are to have an adequate land-based deterrent.

In that context, if we are stymied at development of the MX, if Congress caps the development so that only 500 of those warheads are afforded by the Peacekeeper missile, then I assume that if we are to meet that valid requirement we have to find some other way to present the 1,000 warheads, and will be required to do so. Currently we have been discussing the small missile in the context of 500 warheads, and the estimated cost that is estimated by the General Accounting Office and, I think, most others who have looked at it ranges for those 500 missiles in the neighborhood of somewhere between $44 and $50 billion.

So, if we are looking to meet that Scowcroft Commission requirement in a different way, that is, with 1,000 single warhead missiles, then we are looking at something like $88 and $100 billion.

Dr. HICKS. Certainly in the $80, $90 billion class. That is right. There is another interesting issue here. At other hearings you should ask questions about the basing modes themselves. I mean, you have to spread 500 missiles around at different operating bases. It is not all that easy to find adequate real estate to base that many missiles.

We have been able to find adequate land for 500 missiles, as you will see when that report comes over, if it is not over already. And of course it turns out most of these are in the West, because that is where the large land areas are that we have access to.

If we start to use eastern facilities, it is difficult to find facilities where you can put more than 40 missiles per facility. So it is not an easy problem even ignoring the dollar number.

Senator WILSON. Dr. Hicks, I think you had made quite clear that your concern is cost, that you have no quarrel with mobility. Is it a statement of your position that you think that there can be merit in the survivability of stability that is offered by mobility? What you are concerned with is that we achieve cost savings if it is possible to do so at no cost to survivability?

Dr. HICKS. Exactly.

Senator WILSON. One of the contractors, one of the two developing the HML, in order to demonstrate its mission capability as it is currently required to perform overloaded it, and they simulated a much greater load. They actually loaded it up to a total vehicle and missile weight, simulated missile weight of 220,000 pounds, and discovered that it suffered no loss in performance of its mission requirements.

Does that indicate to you that additional time should be taken to test a different HML, one obviously configured to carry a larger load to determine whether or not it can also perform without lost mobility and therefore without any lost survivability?

Dr. HICKS. Yes, that is one of the things we would task the Air Force to do during this year to prepare for the DSARC.

Senator COHEN. Could I just inquire as to whether the Air Force had access to that information?

Senator WILSON. Did they have access?

Senator COHEN. You said one of the contractors.

Senator WILSON. Yes, sure.

Senator COHEN. And the Air Force has access to that, and did not include it?

Senator WILSON. The Air Force was present.

Senator GORE. Would the Senator yield to me briefly on that point?

Senator WILSON. What I am talking about, Bill, is—I can show you the videotape. Martin Marietta and Caterpillar, and they did this in order to demonstrate the ability to perform above requirements. The point that I am making is, what they demonstrated there, I think, indicates that we should examine precisely the question of whether or not a larger, heavier transporter, and I would assume it would weigh something like 260,000 pounds, can achieve the same dash capability and do so in a way that would allow us to have a two or three warhead missile at a significantly reduced cost, but at no cost in terms of its survivability.

Senator COHEN. I raise the question, Senator Wilson, because the Air Force report indicates that raising the missile's weight to these levels impairs mobility, so I guess we will have to wait until the Air Force testifies.

Dr. HICKS. I think, frankly, Senator, those are things that are going to have to really be done this year. There is not sufficient data on them to give us good answers.

Senator GORE. Would the Senator yield to me on that question?

Senator WILSON. Briefly.

Senator GORE. It is my understanding from the Air Force that this particular test was not designed to simulate a larger missile, but was designed to simulate what was necessary to carry the 30,000-pound missile plus the associated gear necessary for a 30,000-pound missile.

Senator WILSON. The whole point, I think, is, and I think Dr. Hicks has made this quite clear in his plea for more data before we make the decision, which may be a mistake in terms of the cost, if we are talking about $88 to $100 billion for this program at the same time we are attempting to develop Trident, ATB, SDI, and a number of other systems, I suggest to you we may never get to building anything like the number necessary to meet the valid requirement of 1,500 land-based warheads, and what I am saying is that this test, which was not designed for that purpose, I stipulate to that, indicates that at 220,000-pound HML, the transporter was able to dash just as it was at the lower weight.

What we ought to be looking at and taking the time to find out is whether or not the larger, heavier transporter can do the same thing, and not to do that, as Dr. Hicks suggested, would be a really great error, like putting our head in the sand.

Senator **Glenn**. We have tests going on at Yuma right now. We will know a lot more when those get done. They are running right now today out there, are they not?

Dr. **Hicks**. Yes, the Air Force is addressing this problem and trying to find out numbers right now. I have a letter going to the Air Force today that specifically spells out what kind of things I want them to give us before DSARC II, which will be in December, and reschedule the DSARC from October to December to give them the time to conduct the research.

Senator **Wilson**, Mr. Chairman, we are testing the patience of our colleague from Nebraska. Mr. Exon——

Senator **Cohen**. We are only reciprocating, Mr. Chairman.

Senator **Wilson**. Thank you, Mr. Chairman.

Senator **Warner**. First, I would like to get a consensus of the committee. It is not a consensus of the committee we would not support an amendment to go back into the Titan Program?

Senator **Exon**. I was about to bring that up, Mr. Chairman. [General laughter.]

MIDGETMAN MISSILE

Mr. Secretary, let me ask you a few questions about the Midgetman missile. The last that we had officially heard, the Air Force had made no final determination of the number of Midgetmen we would need to execute the SIOP mission. Can you enlighten us on this?

Dr. **Hicks**. Well, the administration's plan, the Air Force plan, of course, based on their acceptance of the Scowcroft Commission report, was for 100 MX's, which would give us 1,000 warheads and about 500 small ICBM's, which would raise the total to 1,500. I have had recent discussions with General Welch at the Strategic Air Command [SAC], about the 1,500 number, and that still is a very valid number in terms of SAC's requirements. So however we get those RV's, Senator, we need 1,500.

Senator **Exon**. So the numbers that we are still shooting for with the Midgetman are the same as originally envisioned?

Dr. **Hicks**. The original plan was, if we had 100 MX's, we would need about 500 small ICBM's. If we only had 50 MX's, we are talking about 1,000 small ICBM's—with a single warhead in order to get to the same 1,500 number.

Senator **Exon**. Do you have any preference as to what the numerical relationship between MX and Midgetman should be? In your opinion, is it pretty well decided as of now that we are only going to deploy 50 MX?

Dr. **Hicks**. Well, I keep hearing that.

Senator **Exon**. So it is finally getting through? Then that means 1,000 Midgetmen. Is that right?

Dr. **Hicks**. If they are single warheaded, right.

Senator **Exon**. The CBO report has raised the question as to whether the Air Force may need as many MX's for testing purposes as originally envisioned. I certainly recognize the need to test our systems' reliability and to demonstrate our deterrent.

Can you tell us if fewer MX missiles are needed for testing purposes than originally sought to support 100 deployed MX missiles?

Dr. **Hicks**. I cannot. I am not an expert in that area, sir, but I will say this, that the original program was for 220 some missiles, to include 120 test missiles. It seemed to me at the time when I saw the report before I came to government to be reasonable, because you need to continue testing missiles, not just through the development phase, but to make certain that you really look at deterioration of shelf life and so on.

So there is a continual need to continue tests, and so I would assume that the requirement was thought out, and that the 120 or so missiles for tests in the original program were reasonable. What has happened to that in terms of the situation today, I do not know. The Air Force is still going along with the—and so is the administration, with the premise that we are going to have—we believe, two basing modes that are very reasonable, that give us the kind of capability we need. We are going to have the additional data this year so we will be able to bring that up into the DSARC issue, too. But we think we will have met the congressional requirement for a satisfactory basing mode for the second 50 MX's.

Now, I recognize every place I turn that that is not a popular situation, but if you will look at the cost issue in terms of how much money we have to put into a land-based ICBM force, find the proper basing mode for MX, and going to the 100 MX's and then fulfilling the other requirement with the mobile 500 is by far the cheapest way, rather than going to 1,000 small ICBM's.

My other point was, if we can MIRV the small ICBM and still maintain its characteristics, mobility and all of the basing issues, then that saves us more money, and I would like to be saving money because we have a major problem in conventional deterrence that we are going to have to face, and we should be putting as much money into this phase of the program as we can.

TRANSPORTING VEHICLE FOR MIDGETMAN MISSILE

Senator **Exon**. Mr. Secretary, let us talk about the transporting vehicle for the Midgetman. Has that been narrowed down to any significant extent yet? I mean, we have talked about everything from the back of a three-quarter-ton pickup truck to a very large tracked vehicle that could go right straight across land.

What can you tell us about the transport vehicle for the Midgetman? How far along is its development?

Dr. **Hicks**. They have come along very well. Two contractors that I know of, and I have not followed that in detail, but I have seen presentations on those two, have adequate design and have been tested adequately to see that they give the hardness they need when they are in a deployable situation. So, I think that the hard mobile launcher problem is in fact a solvable problem, and I believe it also is solvable if it grows in size. It still will be something we can do and meet the hardness requirements for the areas where we are planning to deploy the missiles.

SOVIET SEA-LAUNCHED BALLISTIC MISSILES

Senator EXON. I have one last question with regard to the accuracy of Soviet sea-launched ballistic missiles. A basic fact of our triad is that the sea-launched missiles are not as accurate, of course, as are fixed-based ICBM's. The difference in land-based and submarine-based flight time to respond with our own forces. But what happens if Soviet submarine missile accuracy improves to that of land-based missiles? Would this not pose a new survivability problem for us? When do you think the accuracy of the sea-launched missiles might be a prime threat to our existing fixed-based silos?

Dr. HICKS. Well, I am not sure when that will happen. Let me say, an interesting aspect of sea-based submarine-launched missiles from the Soviet Union, though, when we go to an area concept, a mobile concept, we are talking about putting missiles over 8,000 square miles, which is what they have to do in order to meet the threat. The accuracy of their warhead is not very important. They have sufficient accuracy now, frankly, with their sub-launched missiles to do that kind of a job. They do not have to have precision. They have to have overwhelming overpressure over a large area.

Something we fail to talk about much in terms of vulnerability of systems is that we think we will be able to see their submarines appearing off the coast and then we will have time to scoot out to our position of better deterrence. But if they have a depressed trajectory, the warning time is reduced to less than 8 minutes. We do not have the 25 minutes or so that we have from an ICBM launch.

So, it is a very valid consideration when we talk about mobile missiles to recognize that we have to be careful as we deploy our forces and tie our scooting capability to really understanding when there is a threat, because the threat can hit us much more rapidly from a sub-based trajectory kind of missile, and particularly since accuracy is not important there. Those are very appropriate missiles to use.

Senator EXON. My time is up. Thank you, Mr. Secretary. Thank you, Mr. Chairman.

Senator WARNER. I thought we would have a quick second round, gentlemen. Could we look at about 3 or 4 minutes each? I am going to defer to Mr. Cohen until I get some materials.

Senator COHEN. I appreciate that, Mr. Chairman. I must say I am struck by the absurdity of much of what we go through, each of us quoting Scowcroft to serve a particular end, Senator Wilson quoting Scowcroft to say we need 1,500 missiles, myself quoting Scowcroft for a different purpose. In fact, the administration has dropped Scowcroft in the Atlantic on the way to Geneva, has it not? The administration has recommended we ban all mobile missiles.

So the debate somehow seems to run chasing its tail from time to time. The administration arms control policy is a ban on mobile systems at this point. So I just point that out by way of the difficulty of trying to get a grip on what we are doing. Second, I would——

Senator LEVIN. You are not speaking of political expedience, though.

Senator COHEN. No, it had nothing to do with political expediency.

Dr. HICKS. May I comment on that, Senator?

Senator COHEN. You may comment at the end. You can respond to everything. My 3 minutes will be up at that time. But I would like to point out that the administration seems to have undergone a change in the last few hours. The Secretary of Defense presented a report to the Congress requesting funding for full scale engineering development this year. Am I wrong on that?

Senator WARNER. I am checking that right now.

Dr. HICKS. Yes, full scale development is funded in 1987.

Senator COHEN. So I assume there is justification for the Secretary of Defense making that request based upon information they currently have, and you are here today justifiably so saying, well, there might be a better way of doing it.

The difficulty we have had is, we are living in a time of technological and political turbulence, and political expediency was part of it. The racetrack system was canceled because of environmental and political opposition. You had support for not 100 MX's, you had support for 200 MX's prior to that being canceled, and that set off a whole different political dynamic at that point.

Then we had a rush to Dense Pack, which struck some of us as being appropriately named. And then that was canceled after about 3 or 4 months' debate, and then we come back to different ways of trying to put together a consensus that could hold together this political institution in something that meant strategic sense, and so we keep going down a line, and then we say, how about a single warheaded system as recommended by Scowcroft, and then 2 years later we have got the administration dumping that on the way to Geneva, and so it creates a great deal of difficulty for any of us as policymakers or politicians or somebody trying to come to grips with the reality of constructing a stable system that is not going to be outrun by technology.

For example, in response, I think, either to Senator Gore or Senator Glenn, you raised the issue, well, assuming the Soviets do not develop a more sophisticated or accurate way of determining and locating our mobile systems, a terminal fix might be one, for example. My understanding is the Deutsch panel rejected going to 70,000 pounds by virtue of the anticipation that the Soviets will, in fact, develop more sophisticated ways of targeting, just as we are trying to do.

Dr. HICKS. They slipped you an earlier rough draft, Senator.

Senator COHEN. Well, we have sources, and so that is one of the reasons why that was rejected, for that very reason they are anticipating this, because we are trying to do the same thing, and so we are all trying to step ahead of this curve and keep ahead of the curve of technology which is not easy to do. So I do not question what you are saying in terms of trying to achieve cost savings if in fact you do not compromise mobility, and that is a legitimate question to raise, but it seems to me the Air Force has made certain statements, and I assume they do not make these reports without justification when they come out and say, raising the missile's weight to the level of 230,000 pounds impairs mobility.

Now, what are we to draw from that? What do we do when we have a statement like that, and say, well, we have got a second opinion in a different office? Where do we go? That is why we have trouble formulating policy, because we do not know what to base it on.

One other thing. Senator Wilson—I am sorry he is not here, because he is my friend, and there is some reasonable disagreement on this issue, but when he was quoting, I believe, Congressman Aspin, it was not entirely an accurate report. What Congressman Aspin said was options involving putting multiple warheads on missiles may save some money. He said MIRV'ing, on the other hand, implies substantial growth in the size of the Midgetman missile and then in turn growth in the missile launcher. This would pose a number of risks, the weight and size of the missile launcher grow, uncertainties in mobility and ability to disperse, and thus uncertainty as to its survivability grow. That is part of the overall quote.

And then finally I would point out that Senator Gore is raising a question. If you go above 40,000 pounds on the missile itself, it seems to me inevitable you have got to go back out and recompete the missile itself, and I would assume the launcher, too. I mean, you cannot have people who are basing their whole production analysis on something that weighs 30,000 or 45,000 or 40,000, then say, by the way, folks, we have decided to go to 50,000 or possibly 75,000, but we are going to hold the same contractors. That to me would invite a great lawsuit against the Department of Defense.

Dr. HICKS. Certainly you would have to recost the thing and decide whether you want to compete or not. Let me make a couple of comments. One is that——

Senator COHEN. You can take as long as you want now to respond.

Senator WARNER. I thank my dear colleague for his guidance, but we do have the Department of the Air Force here, and and I am anxious to have our colleagues be present for that. Please proceed, and be responsive, of course, to the Senator's questions.

Dr. HICKS. The issue of putting mobile missiles on the arms control docket does not mean that the administration is backing away from the mobile missile concept. I think that is like saying that we would like to have no nuclear weapons, as the saying goes, but we at the same time are building nuclear weapons.

The issue here is that mobility is better for the Soviet Union than it is for the United States, because they do not have environmental constraints. They do not have the problems we have when you start to move a Midgetman down the main street of a city, despite the fact that Senator Glenn would like to see that on the east coast as well as the west coast. And they have much more forested lands. They do not have the same kind of problems we have at all. So, mobility gives the Soviets a distinct advantage.

Senator COHEN. We have been trying to urge that upon them for years.

Dr. HICKS. So the fact is that by saying we are willing to put that on the table as an arms control issue—you see, the other problem with a mobile missile is its nonverifiability. It is very hard to verify how many you have. So I do not think that you can tie or link the fact that somebody put mobile missiles on the arms control negotiating table as saying we are against mobile missiles.

The second thing is that it is in the budget, and it should be in the budget, because we hope to proceed with a mobile small ICBM, full-scale development some time in fiscal year 1987. What I am saying is, we do not know what to recommend in terms of the specifics.

The kinds of trades we are making are not revolutionary trades. We have MIRV'd missiles. It is not as if we are going into some unusual kind of physics here. These are engineering trades that should have been done, and I believe, as a new boy on the block, have not been done.

When they are done, we will come up with conclusions and make recommendations. We will continue to seek improvements as fast as we can.

Senator **Cohen**. I have never seen a weapons system when you did not change a screw that it did not end up costing us millions of dollars.

Dr. **Hicks**. That is true, after you have already developed it, but we have not developed it yet. We have not gone into full-scale development. Now is the time to make the decisions about fixing a base line so we do not have to change the screws later.

Senator **Warner**. The Chair is just going to take 1 minute of the allocated time to read the committee the statements by Mr. Weinberger on this subject, and they are rather cryptic. In his February 5, 1986 statement, there is one sentence, "We are also requesting funds to begin full-scale development of a new small ICBM." The backup document to the fiscal year 1987 budget says, "We are requesting funds to initiate full-scale development of the small ICBM," and therefore I suppose he left a lot of latitude for his principal scientific adviser some 6 weeks later to come in and expand on that statement.

We will now hear from Mr. Exon, hopefully 2 or 3 minutes.

Senator **Exon**. I have no more questions, Mr. Chairman.

Senator **Warner**. Thank you very much. Senator Quayle.

Senator **Quayle**. Thank you, Mr. Chairman. Let me just be brief, since that is what the chairman desires.

FULL-SCALE ENGINEERING DEVELOPMENT

I think, you know, it is absolutely imperative that before we go to full-scale engineering development we have an understanding and a consensus on what we want. I mean, in view of the Packard report and all the program costs and all these things, it would really be very ironic if Congress, who is always interested in holding down costs and making sure that there are not any cost overruns and things of that sort, got this project on some sort of forced march. The Pentagon is saying, hey, wait a second, before we want to go to full-scale engineering development, we have got a few questions that we want to resolve, so I hope that we can resolve these questions. I think that they are serious. I think the key one is mobility. If in fact you can find that this larger ICBM is somewhere in the ball park, as mobile as the smaller ICBM, then obviously the larger is going to be preferable because of cost when you get into MIRVing.

I think that that is a rather easy choice if we get the data.

We want to see. We want to build on a consensus and ideas that we have had in the past, but, you know, this is way too important to just sort of cast off and to go down on a very inflexible route to something that is going to cost literally billions and billions of dollars. So I hope in the era of acquisition reform and cost consciousness that we will be very deliberate as to how we proceed down this road, and that is all I have to say.

Senator WARNER. Well, as a follow-on to that, it seems to me the obligation of Congress then is to allow the administration to have whatever flexibility it needs to develop a test data base on which to eventually—for the administration and the Congress to make a decision. Now, Mr. Levin.

Senator LEVIN. Thank you, Mr. Chairman. I just want to pursue this point about the full-scale development for one more moment. As I understand it, you are going to be doing certain studies during the year. You are going to look at the impact of MIRV'd ICBM on mobility. You are going to look at how mobile heavier transporters could be. When do you expect the results of those studies to be completed?

Dr. HICKS. I have now scheduled the DSARC, Senator, for December of this year. We looked at the amount of work, the experiments that have to be done, and it was our conclusion that the Air Force needed additional time to evaluate the data and to come to conclusions, so I postponed the DSARC II, which was scheduled for October to December.

I expect to have all the data available to us by December.

Senator LEVIN. All the results of the study, these other options, by December of this year?

Dr. HICKS. Yes, sir.

Senator WARNER. Senator Levin, you might say that is the politically expedient selection of a date, 1 month after an election.

Senator LEVIN. I would not say that. [Laughter.]

Any more than I would suggest that the elimination of that basing mode out west was politically expedient. You would not suggest that, would you?

Dr. HICKS. I would not suggest anything.

Senator LEVIN. That was your decision. It is only the other fellow's decision that are politically expedient.

Dr. HICKS. We could base them in Michigan, Senator.

Senator LEVIN. On the hardening of the silos for MX you have indicated that you can now absolutely prove that you can build silos 25 to 50 times harder than the current silos.

Dr. HICKS. Yes, sir.

Senator LEVIN. Now, would these be hardened Minuteman silos or new silos?

Dr. HICKS. They are new silos.

Senator LEVIN. Has there been a change in this in the last year or two?

Dr. HICKS. There certainly has been. I think what happened before was that a lot of extra conservatism was built into the thoughts of how they were going to design these silos. But as they started to get more and more data they began to get surprising results.

Senator LEVIN. Could you try to go back to a point in time, say, the Scowcroft Commission, and tell us what did we at that point think we could harden silos by? Was it 10 to 25 times? Was it 20 to 40 times?

Dr. HICKS. I frankly was not focusing on that issue at that time, and I cannot give you an answer. I would be glad for the record to give you that information.

Senator LEVIN. If you could supply us for the record how that range has changed over the last couple of years.

Dr. HICKS. I will do it from, say, 1980 on.

Senator LEVIN. That would be great.

[The information referred to follows:]

SILO HARDENING

Prior to 1980 the practical limit to silo hardening, to the extent it was then considered, was thought to be several times that of Minuteman levels, i.e., perhaps within factors of three to five. This limit was set more by concern for survivability of the missile within the silo than by strength of the silo structure. The five-fold increase in hardening also corresponded to what then was thought to be a lethal radius for a cratering burst.

The Closely Spaced Basing (CSB) concept for MX led to renewed interest in silo hardness since the postulated fratricide effects required a ground burst attack. Experimental data for model silos soon demonstrated ten-fold increases in structural hardness levels over Minuteman. Thus, was "superhardness" born.

By 1980 the Defense Nuclear Agency had an aggressive effort under way to reexamine the basis for estimating all close-in nuclear effects for surface and near-surface bursts, with particular emphasis on the influence of geology. To date this work has involved two dedicated underground nuclear tests reproducing atmospheric surface burst conditions at law nuclear yields, an elaborate high explosive simulation of a two kiloton surface burst in a so-called "beneficial site", extensive geophysical exploration of high yield nuclear craters at Enewetok, and many detailed analytical and computer-based studies. As a consequence of this effort, DNA has revised substantially earlier estimates of these weapon effects, most notably in high intensity airblast, crater dimensions, crater ejecta and ground motions in the near-crater region, over a wide range of nuclear yield and geologic characteristics.

At the time of the Scowcroft Commission, the Air Force "advertised" the hardness of their CSB silo at about 12 times Minuteman levels; their vulnerability assessment (i.e., from the attacker's point of view) effectively doubled this value. The DNA advised the Commission that a 40 fold increase in silo hardness was feasible and, depending on the outcome of then ongoing cratering and ground shock activities, system hardness could attain the same levels.

Today, the Air Force and DNA have demonstrated through extensive experiment, analysis and engineering design that, in a beneficial site, silos lie well outside the immediate crater region at hardnesses of 50 times Minuteman levels, and that the weapon system can be designed to survive all nuclear effects under such conditions. The DNA is pursuing an advanced silo hardening research program seeking more cost-efficient designs, and continues to explore the upper limits of system hardness, including the effectiveness of responsive threats and countermeasures.

Senator LEVIN. Thank you, Mr. Chairman.

Senator WARNER. Senator Gore, you want to wrap up for a minute or two?

Senator GORE. Thank you very much, Mr. Chairman.

A couple of people referred to the 1,500 ICBM requirement mentioned in your statement. You did not mean to imply that that was the Scowcroft recommendation, did you?

Dr. HICKS. I am saying that the Scowcroft—yes, it was essentially not a recommendation.

Senator GORE. It was not in the report.

Dr. HICKS. Well, it was discussed by them. It was implied by the number of warheads they talked about. They said they wanted 100 MXs. That is 1,000. And although 500 is not even discussed in the report, there was lots of discussion with members about 500 small ICBM's. The reason is that SAC was telling people they needed 500, and that is still true. It has not changed.

Senator GORE. Well, there is a difference between SAC and the Scowcroft Commission. I respect them both, but the Scowcroft Commission does not outline the 1,500 requirement, and when General Scowcroft testified before this committee in 1983, he said,

> There is nothing particularly magic about the figure 100. What we felt was that there should be a deployment of less than that which would constitute a full and obvious first strike capability against Soviet hard targets. At the other end, we felt the deployment should be sufficiently large to demonstrate will rather than weakness.

I would submit that the issue is not that we need 1,500 ICBM RV's. The issue should be how many surviving ICBM RV's we need, and there is a synergy, Mr. Chairman, between an invulnerable Midgetman force and a deployment of MX missiles which in and of themselves may not be survivable, but when coupled with a Midgetman force that requires the entire Soviet arsenal to knock it out, confers additional survivability on an MX force, and many of us mean what we said earlier on about having an open mind about this open production line on MX's, looking at different basing modes. That is all contingent on the administration's commitment to proceed with a single warhead mobile ICBM.

Now, you mentioned that you would like to see the Price amendment done away with. You would like to eliminate the linkage passed by the Congress between Midgetman and MX also. That is in the Price amendment also. Did you want to do away with that?

Senator WARNER. I think in response to my question he said he would look at that. I do not know whether he was——

Senator GORE. Mr. Chairman, he said he wanted to do away with it altogether.

Senator WARNER. I asked the question that way, and the reply was yes, in terms of the weight constraints, but in terms of linkage with the MX Program, he would like to look at it, and they are going to send forth an administration proposal of an amendment, but you may reply to the Senator's question.

Dr. HICKS. That is exactly right. The part that I said yes to was the weight restraint. I thought that is what we were discussing.

Senator GORE. Let me just say in conclusion, Mr. Chairman, in response to some of the comments made about developing a consensus on this system, there is a difference between a consensus and unanimity, and with respect to this particular system, we have had the Scowcroft Commission report. We have had overwhelming bipartisan votes in both the House and the Senate. We have had a lengthy study by the Air Force which apparently was initially skeptical about the system, but having studied it very closely and worked very diligently to perfect the idea, they have now submitted to the Congress a report that is strongly supportive of the system as originally outlined by the Scowcroft Commission, then yet another panel was created, the Deutsch Commission, and this distinguished group of scientists and strategists spent a great deal of time looking at it.

They have now completed their report. The Defense Department will not release it yet. But we have been told what it says. It is strongly supportive of the same concept again, and the strength in the Congress still remains, so there is a consensus. What we have is consensus, but not unanimity, and a relatively small group of people are saying never mind the consensus, let us delay, delay, and study it again.

We studied it once, twice, three times. We have a consensus, but no, let us delay some more to hold open the possibility of MIRV'ing it. I just think that if we want to—and you conceded, Dr. Hicks, that this system gives us the promise, with the constraints on warheads just in the SALT II range, it gives us the hope of achieving an invulnerable land-based counterforce capability which was long sought.

Given that possibility, I just think that to delay, delay, delay and threaten the consensus that has been developed would be a very serious mistake, and Mr. Chairman, I again thank you and the subcommittee for your courtesy.

Senator WARNER. Thank you very much, Senator.

Would you like to make some reply?

Dr. HICKS. Yes. I think that the important thing here is to recognize that there are no absolutes, and the small ICBM is not an invulnerable force. What you are talking about is the price you make the enemy pay in order to knock out that ICBM force with the first strike. There are an incredible number of subtleties involved in the trades between offensive capability and deep hardness and defensive capability that you know we cannot go into here. There are arguments that cause what we have found to happen, that we get away from the technical views of things, and it is very difficult even for the greatest scientists to keep their political views out of their technical consideration.

The fact of the matter is, we do not have, and I can get a number of people to line up here, including members of the Defense Science Board, who will say we do not have the data to make certain conclusions. The Defense Science Board report, as you will see, asks for things that have to be done, including statements about terminal defense and the fact that terminal defense was not even considered.

So, all I am trying to do is not upset the applecart, Senator, but to try to save some money, and what I really believe we can do is to do a good job getting data. This is not a study. That sounds like what we too often do, sit around in a room and listen to the experts come in and tell us what is right, and then make conclusions. That is the way most board reports are all about.

But we are talking about now having the Air Force go out and work areas they have not done before and I have seen enough in studies that I would never put my faith in something right now full-scale development that says is a good thing to do.

Senator GORE. You are saying keep the Air Force going with the program as scheduled while you look for additional data. You are not saying stop it dead in its tracks.

Dr. HICKS. That is what I have always said.

Senator **Gore**. OK.

Senator **Warner**. I think we are clear.

Secretary Hicks, I believe that I express certainly for myself and members of the committee our appreciation for your appearing here this morning. While we may have differences with respect to the substance of your views, I think we are of a mind that you have presented yourself well and convincingly, and have presented the confidence of your own convictions, and you have made a good witness.

Dr. **Hicks**. Thank you very much.

Senator **Warner**. The hearing will recess and will resume in executive session at 11 a.m.

EXECUTIVE SESSION

The subcommittee resumed its hearing at 11:04 a.m., Senator John W. Warner, presiding.

Senator **Warner**. The subcommittee now turns to the second panel and welcomes back Hon. Thomas E. Cooper, Assistant Secretary of the Air Force for Research, Development and Logistics, who has appeared before this committee many times.

We also welcome for the first time Lt. Gen. Bernard P. Randolph, Deputy Chief of Staff for Research, Development, and acquisition and Brig. Gen. Charles A. May, Special Assistant for ICBM modernization.

These witnesses have responsibility within the Air Force to carry out the ICBM Modernization Program. Before we begin with the testimony today, I personally want to commend the Department of the Air Force on its very outstanding efforts in carrying out the ICBM Modernization Program. The MX Research and Development Program has been one of the more successful missile development programs ever undertaken, with a 100-percent flight test success rate thus far, with every indication that the system will meet its initial deployment schedule this year, with performance well within the original estimate.

Similarly, the small ICBM program can be held up as a model on acquisition strategy that has achieved impressive technical results as we move toward the DSARC.

Gentlemen, you and your predecessors, as well as General Casey and General Barry at the Ballistic Missile Office, deserve the credit for this, and I want you to know that I personally would like you to convey those expressions of mine.

Gentlemen, the floor is open for any introductory remarks by my colleagues.

Senator **Cohen**. No comments for me.

Senator **Warner**. Thank you.

Senator Exon.

Senator **Exon**. No, Mr. Chairman.

Senator **Warner**. Thank you.

Let us proceed, Mr. Secretary.

STATEMENT OF HON. THOMAS E. COOPER, ASSISTANT SECRETARY OF THE AIR FORCE FOR RESEARCH, DEVELOPMENT AND LOGISTICS

Dr. COOPER. Thank you, Mr. Chairman. It is nice to be back. In fact, before I came over this morning I was just reminiscing. I think you and I in one form or another have been discussing the ICBM modernization program, primarily MX, over the past few years, since I guess about 1978. And we look forward to the opportunity to do that again this morning.

Senator WARNER. Senator Cohen probably precedes that.

Dr. COOPER. Probably longer than that. Senator Cohen, I can remember on the House side the many hours that we spent on the various basing modes for Peacekeeper—MPS——

Senator COHEN. It was the order of forces report in 1978 which had the vertical system proposed at that point, and ran smack into SALT II, and we had to change it from a vertical to a horizontal.

Dr. COOPER. That is right.

Mr. Chairman, I think as you correctly pointed out in your statement—and with your permission, I am going to dispense with any extensive opening remarks. I think Dr. Hicks in his prepared statement covered pretty much the same sorts of issues that I would cover.

But what I would point out is, I do not believe the issues with Peacekeeper and small missile are programmatic in nature. I think the issues are whether or not we are following the right program, and I would just point out to the members we are following the program that has been directed by the President and has been previously accepted, in fact in some cases, mandated by law.

We are the developers and acquirers of the ballistic missile systems and, if I could be so bold, I think I can tell you we can build you pretty much any flavor ballistic missile that you would like to have us build. Our issue in the Air Force is what is the ballistic missile that the country wants to have built for the future.

We have been on various courses over the past decade, and right now the course that we are on is, of course, to deploy 50 Peacekeepers in existing silos, and we are currently taking a very hard look at potential survivable basing modes for an additional set of Peacekeepers in the future.

And of course, we are following the Scowcroft Commission recommendation, which was accepted and in fact I think legislated in law, that we build the Nation a single warhead mobile ICBM in the 30,000 pound class.

We are also looking at additional basing technologies. That is the program we have been on since the Scowcroft Commission came forward with its report, and I understand that Dr. Hicks has discussed some alternatives with you this morning. We would be happy to do that as well if that is your pleasure.

But in the meantime, while these discussions are going on, we are moving down the path on the program that has been directed by the President and mandated in law. I think that is all I need say, Mr. Chairman, for my opening remarks. We have a very good news story to give you. I think both the Peacekeeper program and the small ICBM program are model programs. I honestly do not know of any other program in the Department of Defense that has had a better track record than Peacekeeper.

In some ways it is kind of sad that it has come off track, but I certainly understand the political problems with it. But I am sure, as Dr. Hicks mentioned to you, we are 11 for 11 now, and the accuracies have been absolutely outstanding. It is a technological marvel, the missile that Al Casey and his people have been developing and we are now in the process of procuring for the Nation's arsenal.

And I have every reason to believe that the small ICBM Program will likewise be a model program. We have had vigorous competition. It is on track. We look forward to a full-scale engineering decision in probably the December timeframe of this year, assuming that that is the course that we stay on.

So with those brief remarks, what I would like to do with your concurrence—this is General Randolph's first appearance in his capacity as the Deputy Chief of Staff for Research Development and Acquisition. He has a very short overview briefing of the overall ICBM program, and then General May will give you an update on where we are with the specifics of the small ICBM and Peacekeeper.

Senator WARNER. General.

STATEMENT OF LT. GEN. BERNARD P. RANDOLPH, USAF, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION

General RANDOLPH. Mr. Chairman, if I may, I prefer to stand, if you can hear me.

ICBM MODERNIZATION

I only have five charts and I just want to very quickly put things in——

Senator WARNER. Do not worry about being quick. Just get it done carefully.

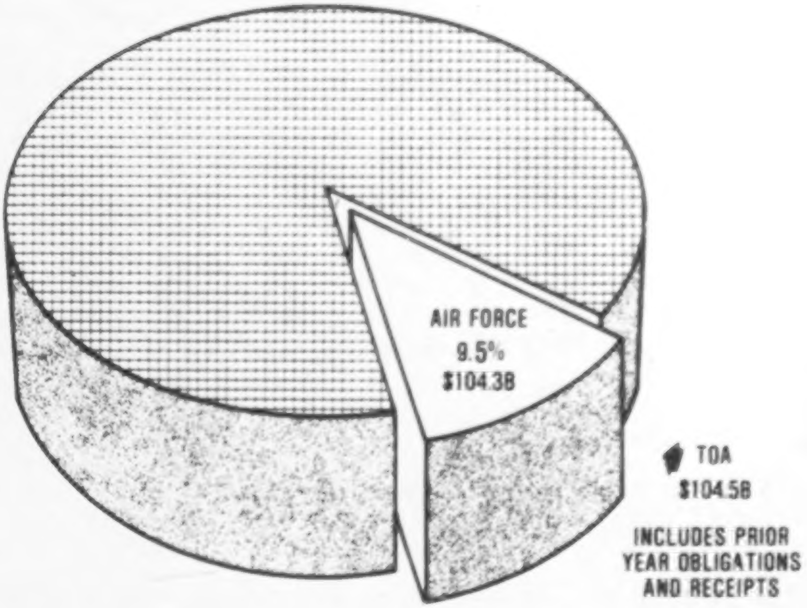
General RANDOLPH. Yes, sir.

Senator COHEN. We are only quick on our questions.

General RANDOLPH. Actually, what I wanted to do is give you an opportunity to ask questions rather than my talking.

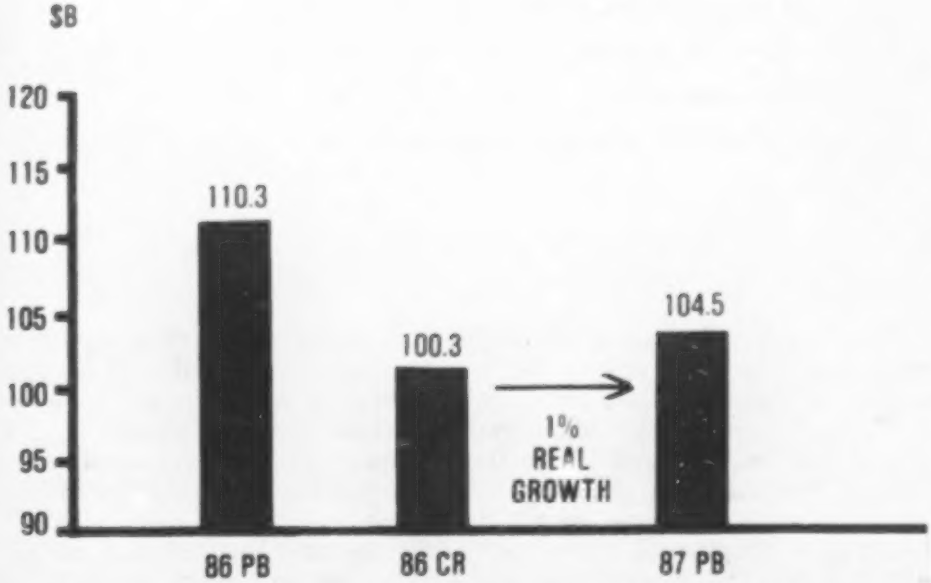
FISCAL YEAR 1987 FEDERAL BUDGET AUTHORITY REQUEST

TOTAL: $1,102.0B



This chart here simply says, this is the request that the Air Force has for the system. This year $104.5 billion is our TOA request in the Federal budget.

COMPARISON OF FY 86 BUDGET AND FY 87 REQUEST



The point I want to make, Mr. Chairman, is that $104.5 billion is less than our request for fiscal 1986, and in recent memory that is certainly a switch. This is the first time, at least that I can recall, in recent history that we have had a request that is less i[illegible] current year than it was in the previous year.

Senator WARNER. Is John Lehman gaining on you?

Dr. COOPER. He is holding his own, Mr. Chairman, that is for sure.

General RANDOLPH. Sir, I think it would be foolhardy for me to respond to that question.

Senator WARNER. That is above your pay grade.

General RANDOLPH. Yes, sir.

FY 1987 AIR FORCE BUDGET PRIORITIES

FY 87 priorities reflect commitment to "stay on course" and continue addressing improvements most vital to combat capability

- Modernize strategic forces (offensive and defensive)
- Improve readiness and sustainability of general purpose forces
- Increase airlift capability
- Modernize and expand tactical forces

and

- Improve ability to operate efficiently and effectively in space

This chart talks about priorities. I do want to point out and the chairman's remarks are certainly pertinent on this subject, we are trying to maintain that set of priorities that were started back in 1981, particularly in modernization of the strategic forces. And I would like to point out to the committee one fact about the Peacekeeper. We will have the initial operational capability in December of this year, and if you recall that December 1986 date was set 8 years ago. Despite all of the perturbations and the ups and downs and the twists left and the twists right, we are going to make a December 1986 IOC. So Peacekeeper is indeed a model program.

Also, in the strategic modernization program is the bomber leg of the triad. I would like to point out the fact that we in the Air Force, when we developed the programs, like to consider the programs in the context of the triad, and we think that is very important in the analysis and in the trades that have to be done.

Of course, the B-1B initial operational capability will be achieved in September of this year, so we are proceeding along quite well with the modernization program and remaining on schedule, the schedule that was set back in 1981.

In the area of readiness, the Air Force story is indeed a good news story, and I will just give you one example. The Tactical Air Command airplanes today—that is all of the fighters, the new and the old tactical fighters together—85 percent of all those fighters right this minute are in commission. That is the best in commission rate that we have achieved in many years, and that is because of the excellent support that the Congress has provided in a number of areas—in the spares, in modernization of equipment, in providing the necessary resources to do the training.

So that is another good news story. In addition to that, I would like to point out to the subcommittee that the Air Force last year achieved the lowest accident rate in the history of the Air Force, 1.49 accidents for 100,000 flying hours. And that is under very realistic training conditions, under very difficult training conditions, and yet we were able to achieve that very low accident rate.

In the area of airlift, we are moving forward also. Two C-5B's have been delivered to General Cassidy and the Military Airlift Command, and he will have nine of those flying this year.

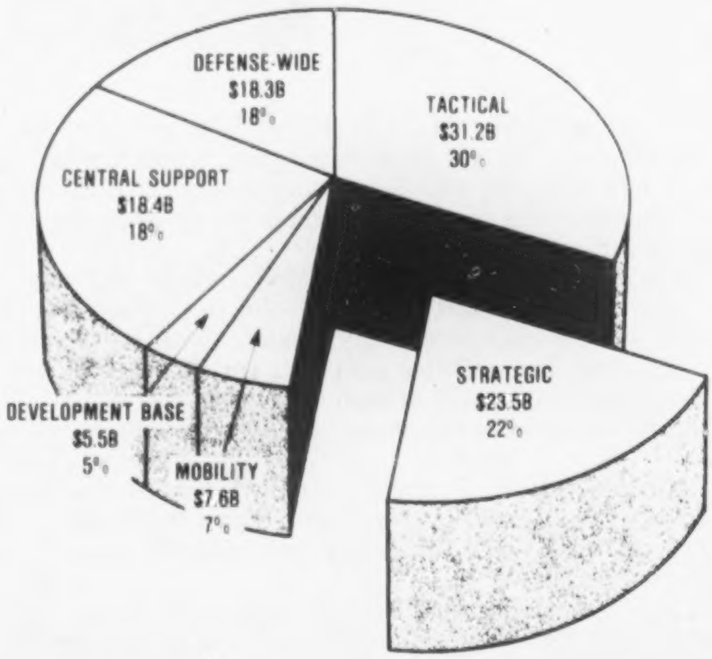
In the modernization of the tactical forces, the F-16 and the F-15 are moving along quite well. We are proposing to reach 40 tactical fighter wings by 1991, given that we have the support of the Congress.

And in space we are moving forward quite well with the Consolidated Space Operations Center at Colorado Springs. The facility has been completed and we have begun controlling GPS satellites from that facility just a couple of months ago in January.

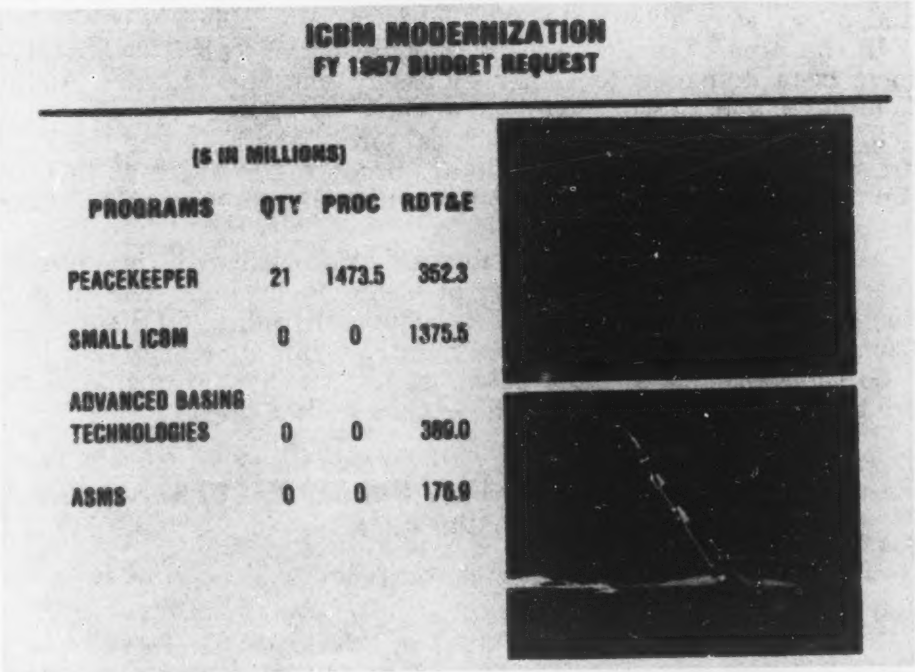
So the programs and the priorities are moving forward, and we are getting the kinds of capabilities that we had hoped for.

USAF FISCAL YEAR 1987 BUDGET REQUEST
BY MISSION AREA

TOTAL: $104.5 BILLION



This next slide points out the area that we are going to concentrate on today and its percent of the Air Force request. Twenty-two percent of the Air Force budget is devoted to strategic programs. And by the way, I did not mention the command, control, and communications, but that is also moving forward, and as you know that is a critical part of the strategic modernization program.



ICBM MODERNIZATION
FY 1987 BUDGET REQUEST

($ IN MILLIONS)

PROGRAMS	QTY	PROC	RDT&E
PEACEKEEPER	21	1473.5	352.3
SMALL ICBM	0	0	1375.5
ADVANCED BASING TECHNOLOGIES	0	0	389.0
ASMS	0	0	176.9

This chart is really the final chart that I have to discuss before I turn it over to Gen. Charlie May. But again, these are the numbers of Peacekeepers that we are requesting and the small ICBM Program, as you will recall, really went from no program at all in 1983 to a model program today.

There is tremendous competition involved in the small ICBM program. We have competed in exactly the right way that we think the Congress would want, certainly a way which we are extremely satisfied with, and as you have noted in your opening remarks, we put this program together in a model program form.

That, Mr. Chairman, really concludes my very brief introductory remarks.

Senator COHEN. Could I just inquire, who were the major competitors in the small ICBM, the missile, and who were the major competitors on the HML? Are they one and the same? Are they separate?

General RANDOLPH. No, sir, they are separate.

Senator COHEN. Could you identify them for us, please.

[The information follows:]

MAJOR COMPETITORS IN THE SMALL ICBM

The contractors for the small ICBM—missile only—are as follows:
Propulsion (competitors for each stage):
State I—Morton Thiokol: United Technologies Corporation.
Stage II—Aerojet Strategic Propulsion Company; Hercules, Inc.
Stage III—Hercules, Inc., United Technologies Corporation.
Guidance:
(1) Modified AIRS (Baseline): Northrop, Inc.

(2) Ring Laser Gyroscope (Alternate Guidance Competitor): Litton Industries; Honeywell, Inc.

(3) Stellar Inertial Measurement (Alternate Guidance Competitor): General Electric.

(4) Guidance and Control Integration: Rockwell/Autonetics.

(5) Assembly, Test and System Support (ATSS): Martin Marietta.

The contractors for the small ICBM—Hard Mobile Launcher (two competitors) are as follows:)

Martin Marietta Aerospace and Boeing Aerospace.

General **May**. Sir, we had four contractors competing for the hard mobile launcher. We had Martin Marietta and Boeing, the two contractors that won, and then we had General Dynamics and McDonnell Douglas competing, and they were the two losing contractors.

I assume you are talking about the stages for the missile?

Senator **Cohen**. Well, basically, I will tell you what I am inquiring about. Let us assume—and Dr. Cooper, you are right, you are ready to go full-scale development in December.

Let us assume that you are told in December that, we have had a change of heart and mind, we think we could put a three-warheaded system in that would give us the same mobility. At that point—and it is going to weigh 75,000 pounds, and HML will go up to, let us say, 230. Would you have to go back out and compete that again?

General **Randolph**. Senator Cohen, I can respond to that question. The answer is "Yes." The missile right now, as you recall, is a 30,000-pound missile. We believe that we can take that up as high as 40,000 pounds without really materially impacting the configuration. Once we go beyond 40,000 pounds, we really have basically a new missile, and it would be improper and really not in accordance with the law for us to recompete.

Senator **Cohen**. You would find yourself a lawsuit if you tried to——

General **Randolph**. Yes, sir, well, it would be tantamount to having a competition to build a fighter and, after we hired the contractor, we say let us build a bomber. You know, it just does not work.

Senator **Gore**. Would there be significant delays in recompeting the contract?

Dr. **Cooper**. Yes, in the program there would be significant delays.

Senator **Gore**. Of what estimated duration would those delays be?

Dr. **Cooper**. What would be the delay in the program? Let me give you my estimate. A couple of years.

Senator **Gore**. A 2-year delay?

General **Randolph**. On the order of a 2-year delay, yes, sir.

Dr. **Cooper**. Just as a case in point——

Senator **Warner**. Had you given your estimate, Mr. Cooper, Dr. Cooper?

Dr. **Cooper**. That is a consistent Air Force estimate. It is about 2 years, not just due to competition.

Senator **Warner**. Do you predict that on anything over 40K?

Dr. **Cooper**. Yes, that is right. Well, anything that involves a three-warhead small ICBM is going to be a major new system.

Senator WARNER. Why do you not give us the criteria on which it would require in your judgment a 2-year delay in the program? What are the variables?

Dr. COOPER. Senator, anything that would require us to change the diameter of the rocket motor, which is currently 46 inches. We think we can go up to about 40,000 pounds by adding length, and that would allow us to go with this basic design that we have now. That would allow us to go from 30,000 pounds to 40,000 pounds.

You grow that weight by adding length but not diameter. If you get much bigger than 40,000 pounds you have to do that by increasing the diameter of the missile, and that is a major new design. As an example, I believe—and Charlie, correct me if I am wrong—if we go into the 65,000- to 75,000-pound class, three-warhead small ICBM, you are probably talking at least 56 inches in diameter.

Senator GORE. Mr. Chairman, if I could pursue this just briefly. Is it also fair to say that once you increase the diameter of the missile then the relationship between the weight of the missile and the weight of the launcher is no longer a linear relationship? In other words, when you are getting a bigger missile by making it longer, then there is kind of a linear relationship between a heavier missile and a heavier launcher, but when you have to go to wider diameter then it is no longer a linear relationship and you get a geometric increase in the weight of the launcher with a larger missile, is that correct?

Dr. COOPER. Senator, now you are talking my type of talk. I am an engineer, πr^2.

You go as the radius squared, so you are exactly right. That is not a linear relationship, whereas when you increase length, you hold the radius constant or diameter, and you are just linearly increasingly the length. So you are exactly right.

Senator GORE. So you are getting much larger increases in the weight of the launcher, with even smaller increases in the weight of the missile above 40,000?

Dr. COOPER. Say that again?

Senator GORE. From 30,000 to 37,000 or 40,000, you get that amount of increase in the weight of the missile and comparable increases in the weight of the launcher. But when you go above 40,000, then you begin to get geometric increases in the weight of the launcher?

Dr. COOPER. Well, when you start to change the diameter you change the volume in a nonlinear way, which greatly increases the weight. And that is exactly what you are saying.

Senator GORE. Thank you.

Senator WARNER. We want to come back and revisit this, perhaps with more care, later.

Then let us finish the direct presentation and then we will turn to an orderly questioning.

Dr. COOPER. Senator, I just want to ask, what is your pleasure? General May has about, I would say, 15 minutes in his overview, and it is programmatic.

Senator WARNER. Let us take that, unless the gentlemen of the committee for reasons of convenience want to pursue questions.

Senator COHEN. I have got to leave in about 10 minutes.

Senator WARNER. Go ahead with your questions.

Senator **Cohen**. I will keep them very brief.

Dr. **Cooper**. Senator Cohen, the presentation that we would give you is essentially the same as we gave you last year, 1 year updated. And there are no dramatic changes in it.

Senator **Cohen**. I just wanted to review some of the statements that were made, for example, in the Air Force report, which is unclassified. And I will just repeat this for the record: A 75,000-pound missile could deliver three Mark 21 RV's, plus the penetration aids and decoy package; and that a 75,000-pound missile would require a HML weight of 230,000 pounds.

That is the Air Force report, is it not?

Dr. **Cooper**. Let me ask General May to respond precisely to that, so we can get your record correct.

General **May**. Sir, I do not believe so. If we talk about a missile that weighs 75,000 pounds and has the attributes which you mention, we think that the HML would weigh somewhere between 280,000 and 300,000 pounds.

Senator **Cohen**. 280,000 and 300,000 pounds.

General **May**. Yes, sir.

Dr. **Cooper**. Senator Cohen, if I might, though, Dr. Hicks has just tasked us—I have been discussing this with him for the last month. We are just about to receive a formal tasking that will ask us to try to refine the answers to those questions, in more detail than we did in the report that was requested by the committee last year.

So what we are telling you is based on the work that we did last summer.

Senator **Cohen**. The report also stated that such a weight at these levels, even at the 230,000—now, you say 280,000—would impair mobility. Is that an accurate description?

General **May**. The basic planning factor that we have is that once you go beyond the 40,000-pound missile, the 200,000-to-210,000-pound system weight, we are confident that mobility is going to begin to degrade. How much it is going to degrade, how rapidly it is going to degrade and so forth, we are not certain we know the answer to that at this time.

And as Dr. Cooper mentioned, assuming we get tasking from OSD, we are going to do some work to try and come up with some data that helps us understand that problem. But we are confident that mobility falls off. We just do not know how rapidly.

Senator **Cohen**. Were the words seriously compromise mobility ever used in your reports?

General **May**. I believe they were.

Senator **Cohen**. So it is not just degrade. Seriously compromise mobility is what you used.

General **May**. That is right.

Senator **Cohen**. And that remains your judgment today?

General **May**. That is right, but we do not have any engineering data to back it up at this time—or sufficient engineering data, perhaps, to correct the record.

Senator **Cohen**. Dr. Cooper.

Dr. **Cooper**. I suspect what you are getting at, Senator, is Dr. Hicks' concern that maybe that is not the case. It goes back to the comment that I made that those judgments were based on the result of the work that we did last summer.

Senator COHEN. What has transpired since last summer?

Dr. COOPER. Nothing has transpired, except that I believe that Dr. Hicks wants us to go in in more detail and to corroborate those estimates.

Senator COHEN. Senator Wilson raised a question, I think a valid issue and I was not familiar with it, and he said that Martin Marietta had performed some tests with a 220,000 pound HML and without any degradation in mobility. Would you explain that?

General MAY. Yes, sir. I have never seen that promo, but as I understand what Martin Marietta did was take the mobile test vehicle that we are presently testing out at Yuma, and they increased the ballast from the normal 30,000-pound payload up to 70,000 pounds. They demonstrated that the mobile test vehicle could carry around a 70,000-pound ballast weight. That, however, does not equate to the kinds of design changes that would have to be made if you increased the missile weight from 30,000 to 70,000, because it would be a geometric change. You would have to increase the weight of the vehicle, you would have to increase the width of the vehicle, the length of the vehicle, and so forth. And it is a different kind of proposition than we are presently testing with our mobile test vehicle.

Senator COHEN. So even given that, at the 220,000 you would have some serious difficulties in terms of accepting the promo as such as being realistic in terms of what is going to be required as far as expansion of the diameter of that missile to get to 70,000 pounds?

General MAY. Well, we think the promo proves that at 220,000 pounds, which would be the equivalent of a 40,000-pound missile, if you did not significantly change the design of the vehicle, which you probably would not have to do, all you would have to do would be to lengthen it to accommodate a longer missle. With this, we think we would have essentially the same mobility that we have with the 30,000-pound missile.

And that is why we say a 40,000-pound missile, and a 200,000- to 220,000-pound HML system, is about the break point on mobility.

Senator GORE. Would the Senator yield on that point?

Senator COHEN. Just a moment.

The point is that the test as conducted does not conform to the reality of what you have to do to get a 70,000-pound missile?

General MAY. That is correct, sir.

Senator GORE. In addition to the point that you are making, I want to reiterate that the increase in the ballast was not meant to represent a 70,000-pound missile, but rather a 30,000-pound missile plus the normal hardware that would go on the launcher with the 30,000-pound missile. Is that correct, General Randolph?

General RANDOLPH. I would not quite say it that way. It was meant to represent the fact that you could go up to a 40,000-pound missile and have a little bit of extra weight carrying capability to carry accessories.

I am not familiar with the promo, either. But clearly it was not meant to test carry a 70,000-pound missile.

Senator COHEN. Just a final point. In any event, your estimate at this point would indicate that you would end up with a HML of about 280,000 or 290,000 pounds?

General May. That is correct, sir.

Senator Warner. And the break point in your mobility was at what point for degradation?

General May. Somewhere around 200,000- to 220,000-pound system weight, which we normally think of as a 40,000-pound missile.

Senator Warner. All right, thank you.

Senator Cohen. I think that is all I have.

Senator Exon. Mr. Chairman, I have to leave also. Could I ask one question?

Senator Warner. Please go right ahead.

Senator Exon. Gentlemen, I was shocked but not surprised at the statement by Dr. Hicks this morning that it is going to cost us more for 50 MX's than the originally scheduled 100.

Dr. Cooper. Yes, sir, I believe that is correct.

Senator Exon. Do you agree with that statement?

Dr. Cooper. Yes. That is because of the stretchout, Senator, in the production rate. And as you know, we tooled up to produce 48 MX's per year. Now, that is four per month. That is the most economic production rate, based on the tooling. And we have been producing, as you know, between, 12 and 21. I forget what the exact rates have been.

But we have not been able to ramp up and take advantage of the efficiency.

Senator Exon. So what you are telling me is that we obviously made a pretty bad mistake when we cut from 100 to 50 missiles?

Dr. Cooper. Well, I believe that, Senator. Even if we are not going to deploy additional MX's, I still believe we should produce at the most economic production rate.

Senator Exon. In other words, we should have decided on the final program size and completely funded it.

Dr. Cooper. And for the test missiles. We could produce the test missiles at a more economic rate. But of course, budget pressures dictate that.

Senator Exon. That is exactly what I am talking about. When I consider the budget pressures we are under right now in the Budget Committee and what is likely to come out of that committee, and I hear this, it concerns me a great deal, Mr. Chairman.

Dr. Cooper. That is a common problem that we have with our programs when you stretch the production rates and you do not recognize the economies of scale.

Senator Exon. Thank you.

Thank you, Mr. Chairman.

Senator Warner. Thank you, Senator Exon.

Senator Gore.

Senator Gore. Mr. Chairman, thank you very much. Let me say at the outset I have never been so impressed with the Air Force as I have been watching the way they have tackled the problem of the single warhead ICBM over the last several years. I think it has been a magnificent exercise.

I was under the impression—I think it might have been accurate—that initially there was some reservation and some skepticism on the part of the Air Force, but then the diligence with which the Air Force launched into this task has really been a remarkable thing to watch, and it has really made me proud of the Air Force. I just wanted to say that for the record.

Dr. COOPER. Senator Gore, I would just like to say, I am proud of the Air Force, too, because it was not an Air Force idea. As you know, it came out of the Scowcroft Commission. We had not proposed a single warhead small ICBM.

I think there were a lot of skeptics in Congress. We had the legislation that held our feet to the fire with the deployment of MX. But the Air Force did move out smartly. We established the program office. We took a brigadier general out of our hide.

And I might just say for the record, Mr. Chairman, we are very saddened by the loss of Brig. Gen. Dave England, who passed away last year. But Dave did an absolutely outstanding job in getting that office up and running. We have 200 people in place now. We have another Brig. Gen. Ed Barry, who is one of our fine young officers, and we follow orders well.

Senator COHEN. And as a result of that, Senator Gore is going to support increases in the Air Force budget this year. [Laughter.]

Senator GORE. Well, if I ever can get on this committee you guys will brainwash me into going along with most anything.

I too wanted to make a comment on General England. I had the opportunity to work with him, and never have I worked with a more patriotic, dedicated American. He was really a tremendous person.

Mr. Chairman, if I may say something else for the record before going to a couple of questions I think that one of the lessons learned in the aftermath of the Scowcroft Commission report is that there is a strategic value in political consensus, insofar as we are a democracy and have to build agreement slowly and tortuously. The Soviet Union does not have to. When we can arrive at a consensus, it has tangible strategic value for this country.

The consensus built around the single warhead mobile ICBM is a strategic asset. A proposal to delay that program in order to explore the possibility of MIRV'ing it should have to carry the extra weight of threatening to undermine that strategic consensus. It is a fragile consensus, and were the system to be MIRV'd it might very well be destroyed and the ICBM modernization program hurt.

Well, let me just make a couple more brief comments and a couple questions.

Senator WARNER. Let me reply to that, because I certainly share with you your observation of the value of a strategic consensus within the Congress and between the Congress and the administration. And I have watched these from my positions in the Department, beginning in 1969 and through 7 years here.

However, we are proceeding to develop facts that could well strengthen that strategic consensus. I do not know how I personally would decide with respect to my single vote following the DSARC and the presentation next fall for the Department of the Air Force. But we cannot fail to recognize that within the period of time this strategic consensus developed a very substantial alteration in the MX program through the wisdom of the Congress, a rapid discovery of the Soviet move into mobility in a variety of ways which I was not aware of 2 years ago, and of course the budget constraints that are coming down on the strategic program as well as other defense programs, requiring us to get, to use a trite phrase, the biggest bang for the buck for all of our systems.

So I do not think that at this juncture in our procedure with the fiscal year 1987 budget that we are in any way making a deviation with that consensus.

Senator **Gore**. Oh, I agree, Mr. Chairman.

Senator **Warner**. But I do believe we are obligated to allow the Department of the Air Force and the Department of Defense the flexibility within which to develop the data needed to perform the DSARC and then return to the Congress.

Senator **Gore**. Mr. Chairman, I do not disagree with a single word you say. In fact, I would also say that I do not think there is any doubt about the fact that the testimony that has come out during your hearing today has indeed strengthened the consensus. It has fallen short of producing unanimity once again, but it has certainly strengthened the consensus.

The very statement that recompeting the contract for a missile over 40,000 pounds would cause a 2-year delay strengthens the consensus. The testimony that a larger diameter missile would have a geometric effect on the increasing of the launcher's weight again strengthens the consensus.

And Secretary Hicks' statement earlier of confirming that he accepts the implications of costs to attack and the implication that this system we are discussing could really give us the ability to have a land-based survivable ICBM I think strengthens the consensus. So I agree totally.

Senator **Warner**. There is a fourth element, and that is that in the arms control talks, as our distinguished colleague from Maine pointed out, the President has put the whole concept of mobility on the table. This Senator thinks it is highly unrealistic that the Soviets would snatch that up.

But on the other hand, if this Nation were to pursue a less than viable, dynamic program in the area of small mobile missiles, you certainly would lessen the chances, whatever they remotely might be, that the Soviets might pick this option up in negotiating.

Senator **Gore**. Another strong point, Mr. Chairman. In the prepared statement of General May, I wanted to focus attention on one section to begin with. I referred earlier to the synergy between the Midgetman and the MX force, and you state that by deploying the Peacekeeper and the small ICBM force as a whole is improved and its flexibility increased.

That is really referring to the kind of synergy that I spoke of earlier, is it not?

General **May**. Yes, sir.

Senator **Gore**. Now, when you talk about flexibility, you have in mind not only survivability, but you have in mind a postattack environment where we are responding in a limited, measured fashion. Does the Air Force believe that there might be some advantages in being able to respond with a single warhead missile as opposed to spending warheads three at a time?

General **May**. Sir, I do not think we can go into that very deeply in an open session. but I think that the fact that we have 450 minutemen II single warhead missiles in our inventory and no plans at the present time to replace them indicates that we find great value as operational planners in single warhead systems.

Senator Gore. Mr. Chairman, I want to underscore that point. The Air Force believes there are strategic advantages in having single warhead missiles in our inventory. The full reasons cannot be explored in open session, but is it not true that the current single warhead missiles in our inventory are due to be retired at some point in the future?

General May. Sir, we have no present plans to retire those systems, but they are our oldest systems, they came in the inventory in the midsixties, and certainly as time goes by, I am sure we will be entertaining either retirement or continual reliability and maintainability upgrades to those systems.

Senator Gore. Although there are no present——

Senator Warner. One technical amendment to your reply; the Titan is to be retired, and that is a single.

General May. That is another single warhead system, sir, that is correct.

Senator Warner. But its retirement is scheduled.

General May. And it is almost complete. I believe it will be complete next year.

Senator Gore. And although there are no present plans for retiring the other single warhead missiles in the system, in the natural course of events, these older systems will arrive at a point where they will need to be replaced.

If the Midgetman system is not built as a single warhead system, then we confront the possibility of having to not have single warhead systems, land-based single warhead systems in our inventory, and the strategic advantages in a postattack scenario of having such a system would be denied to us.

I had some other questions, Mr. Chairman. I will just submit them for the record because you have been so patient and courteous.

Senator Warner. I am going to stay for a while. Go ahead.

Senator Gore. Well, on the cost to attack material, you agree, do you not—or let me just ask you, do you agree that the current recommended deployment mode would require the Soviet Union to expand virtually its entire present arsenal in order to knock out Midgetman?

General May. Sir——

Senator Gore. Given a short warning time of, say, 30 minutes.

General May. We think that the plans that we have for deploying a small missile in several different basing modes would extract a very high price to attack on the part of the Soviet Union. It depends really, in my judgment, on your scenario as to whether or not it would require the Soviets to use all of their weapons, but it certainly would be a very high price to attack.

Senator Gore. Mr. Chairman, those are all the questions I wanted to pursue at this time. I would like to thank you again for your courtesy.

Senator Warner. Thank you, Senator. I would hope that you would find it possible to continue to participate in the hearings of the Strategic Subcommittee.

Senator Gore. I appreciate your invitation.

Senator WARNER. We look forward to the day when you become a member.

General MAY. As do I.

Senator WARNER. Now, Mr. Secretary, why do you not go back and proceed and put together the record that you think desirable to support your program. Take such time as you need.

Dr. COOPER. Mr. Chairman, I think it would be worthwhile to take about 10 minutes, if we could, and have General May quickly give you a program update. I think that will be sufficient for our purposes and sufficient for your record.

Senator WARNER. All right.

STATEMENT OF BRIG. GEN. CHARLES A. MAY, JR., USAF, DEPUTY DIRECTOR AND SPECIAL ASSISTANT FOR ICBM MODERNIZATION, DIRECTORATE OF OPERATIONAL REQUIREMENTS, DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT AND ACQUISITION

General MAY. Sir, I would like to submit a statement for the record.

Senator WARNER. Without objection, the statement will be made a part of the record.

U.S. ICBM MODERNIZATION PROGRAM

General MAY. Sir, it is a pleasure to appear here today. This is my first time, and I am happy to report all the good things that have been accomplished in this program in fiscal year 1985 and to date in fiscal year 1986, and also to give you a brief overview of our fiscal year 1987 program.

Dr. COOPER. Charlie, could you suspend for just a moment?

Mr. Chairman, I would like to say one thing relative to the discussion that occurred before with Dr. Hicks and the discussion that occurred with Senator Cohen and Senator Gore. Obviously there are some questions about where we break in mobility on the small ICBM. I personally feel that the issue that Dr. Hicks has raised is a valid one, there are obviously concerns on your side. I think it is worthwhile to take the time to do that indepth analysis that needs to be done to answer some of these questions. I think there are factual answers that will resolve it. I am not sure that we have done enough analysis in the past to put the issue to bed. I think what Dr. Hicks is doing as the Chairman of the DSARC is exactly what he should do when these types of questions arise, and I just want to let you know that the Air Force is going to break its back over the next few months to respond to the tasking that Dr. Hicks has levied on us to answer exactly these questions that have been raised here this morning.

Senator WARNER. Mr. Secretary, I share that, and I stated the reasons of arms control, budget constraint, and development of Soviet mobile systems as my reason for supporting the Air Force going ahead.

Dr. COOPER. What I would say, and I think that was implied in your statement, is that we should not, however, derail the program that is currently ongoing.

Senator **Warner**. And in no way during the period between now and December is that program derailed, correct?

Dr. **Cooper**. We do not intend to derail it.

Now, I fully recognize that if, say, in December we decide and the Congress concurs that there is a better way to approach this, that we have to expand the diameter, the funds spent up until that point in time, there will be some funds spent that perhaps should not have been spent. On the other hand, if you slow down and come to a complete stop and then decide that the program should continue, there is also a cost there. And I think, while the jury is out, we should basically continue with the program that we have been on, and that is the proposal that we are making.

Senator **Warner**. What the Chair has requested, and the committee likewise, is that we will need some recommendation from the Department of Defense, and more specifically, the Department of Air Force, how in the 1987 authorization and appropriation cycle we have got to deal with the Price amendment to afford you the flexibility within which to conduct a full ranging DSARC and the like.

I presume you are aware of Dr. Hicks' view that he certainly thought the weight limitation has got to be adjusted.

Dr. **Cooper**. On the single warhead.

Senator **Warner**. Yes.

Dr. **Cooper**. To go to the 37,000- to 40,000-pound class?

Senator **Warner**. Yes.

Dr. **Cooper**. Yes, Senator.

Senator **Warner**. Let me make it clear. You know what I am talking about, the amendment.

Dr. **Cooper**. Yes, yes I do.

Senator **Warner**. To what extent do we have to make adjustments to that amendment in the 1987 budget act?

Dr. **Cooper**. Well, I can tell you one adjustment that would need to be made is the weight cap——

Senator **Warner**. To allow you to complete this DSARC in a manner that is best for the United States.

Dr. **Cooper**. There are two issues here, Senator. One is that if you stay with the single warhead small ICBM, the issue is are we building the optimum single warhead small ICBM that will be mobile, that is one issue. The second issue is, should we build a multiple warhead small ICBM? That's a separate issue. There would be adjustments in the Price amendment because that is tied to deployment of MX. We need to respond to that for the record.

Senator **Warner**. Well, let me ask you, you have been here in the Congress as a very important staff member. Do we need to take on the battle of the Price amendment in this particular year, or should we await the results of the DSARC, and I presume the Congress is going to get heavily into the DSARC results. We might even fence funds, I do not know.

Dr. **Cooper**. I believe you are going to have to take on the battle of the Price amendment, specifically as it relates to the weight cap on the single warhead small ICBM.

Senator **Warner**. What if the DSARC came out and said let's stay exactly where we are? Let's build a single warhead, 30,000 pounds?

Dr. COOPER. Well, if they suggest to build a single warhead, 30,000 pound small ICBM, we need no changes.

Senator WARNER. Right.

So the question is should we start changing the Price amendment now or await the outcome of the DSARC?

Dr. COOPER. I will give you a personal opinion on that, Mr. Chairman, that if that were to be the decision of the DSARC, I assume in December, to continue with a single warhead small ICBM, the optimum single warhead small ICBM is not 30,000 pounds, it is 37,000 to 40,000 pounds in our judgment. We have not proposed to change that cap, but if it is the desire to build the optimum single warhead small ICBM that retains its mobility characteristics, we believe you should go to 37,000 to 40,000 pounds. That allows you some extra weight capacity to carry penaids or for a given payload, it will allow you to carry it a longer distance. Summed up, it gives you more flexibility.

We argued that point before the Price amendment was put into effect. In fact, I argued that very point with the House side, to not put a weight cap on the program. I think the instructions to the Air Force should be, come back and tell us what size, optimum size a single warhead, small ICBM that is mobile will be. But I think because of the concerns, and Senator Gore's remark where he complimented us for moving out, I think there were concerns in the Congress that somehow we did not want to do the small ICBM and we would grow this thing and add multiple warheads, so they literally picked up the weight that was indicated in the Scowcroft Commission report, and I think if you remember, they said a small, single warhead ICBM of about 15 tons, and they took that literally, and we had the 30,000 pound cap.

Now, we can build you a missile at 30,000 pounds that will go the required range——

Senator WARNER. Let's save time, and may be we cannot answer the question, but let me frame it, and then you and I and others discuss it.

We are here working on the 1987 authorization bill. We are now, I think, going to reach a consensus that the Department of the Air Force should be given maximum possible flexibility to do the work necessary to bring before a DSARC all options with relation to mobile ICBM systems. Question: Do we have an obligation at this time to change the Price amendment or should we await the outcome of the DSARC, the decision of the Secretary of the Defense, presumably the President and Congress until addressing the Price amendment?

General RANDOLPH. Mr. Chairman, I believe that the Price amendment should be amended at this time with regard to the weight cap because we are continuing to design the missile. We are stuck at the 30,000-pound point. We do not, as we said in our report to you, believe that that is the optimum weight, and until such time as the Congress gives us relief from the Price amendment, we can really do no technical work to go ahead and expand that to the 37,000- to 40,000-pound missile.

So at a minimum we need that weight relief, and we should have that now.

Senator **Warner**. Then I would infer from your comment that you are prejudging the DSARC to eliminate 30,000 under all circumstances, and——

Dr. **Cooper**. That would just give us the flexibility.

Senator **Warner**. I said 30,000.

Dr. **Cooper**. If we had a 37,000- to 40,000-pound cap, that gives us the flexibility to go up to that level. We do not have that now.

Senator **Warner**. Suppose we go ahead and amend the Price amendment to give you the 37 to 40K that you want, and then you turn around and you come back and you want a 50K? So then we have to go back over the Price amendment again.

Dr. **Cooper**. Yes, sir.

Senator **Warner**. I do not know how many times I want to fight this battle of the Price amendment.

Dr. **Cooper**. I understand.

Senator **Warner**. I might well leave it as it is except I think what you are telling me is that under no circumstances is the Department of the Air Force going to come back and say we want a 30,000-pound missile. The bottom line now is 37,000 to 40,000. We may as well go ahead and address that so that we are not wasting money on defining something that you, under no circumstances, are going to accept?

Dr. **Cooper**. I am not sure, Senator, we can say that under no circumstances will the department come back and ask for a 30,000-pound missile. I cannot prejudge what the DSARC is going to come up with. That is the Office of the Secretary of Defense.

What I can tell you is that we in the Air Force believe the optimum size for the small single missile is more like 37,000 to 40,000 pounds.

Senator **Warner**. Let's come back again to the legislative problem, because as Senator Gore pointed out, there is a consensus behind the program as it now stands with the Price amendment, and I want your recommendation as to how much adjustment is required now by way of law to allow you to go ahead and do cost effective work on this program, and give you the maximum flexibility for the DSARC.

Dr. **Cooper**. Well, if that is the question, if you want maximum flexibility, you would repeal the Price amendment altogether.

Senator **Warner**. All right. That is a straightforward answer.

Dr. **Cooper**. And we did not ask for the Price amendment. We did not oppose it at the time, but that was not something that the Department proposed because, you recall, it put weight limitations on the small ICBM, but it——

Senator **Warner**. I know what it did. I have got it right here.

Dr. **Cooper**. The other thing that I think you are going to have to address, if there is a delay in the small ICBM program——

Senator **Warner**. That affects the linkage with the MX.

Dr. **Cooper**. That is it, and we would need some flexibility there.

Senator **Warner**. Gentlemen, I know what it says. I have got it right here, and it is your answer now that the optimum situation would be the total repeal of the Price amendment?

Dr. **Cooper**. That gives us the maximum flexibility, and we are all for flexibility.

Senator WARNER. Flexibility toward developing options at the DSARC.

Dr. COOPER. Yes.

Senator WARNER. And continue between now and DSARC time to expend the moneys in the most cost-effective way on this program.

Dr. COOPER. Yes.

Senator WARNER. Is that your opinion also, General?

General RANDOLPH. Senator, let me just put it this way. Today we are designing hardware, equipment, stages that will give us a 30,000-pound missile. We in the Air Force, believe that that is not the optimum characteristic for a single warhead missile. We would much prefer to use the design money to extend the first stage, by 5 feet to give us the optimum situation, which is the 37,000 to 40,000 pounds. However——

Senator WARNER. Your testimony, read in the cold light of dawn, is saying that the DSARC should come up with that.

General RANDOLPH. Well, yes, sir. Let me just——

Senator WARNER. I am not so sure you want to be saying that.

General RANDOLPH. I am not prejudging the DSARC.

Senator WARNER. You are not?

General RANDOLPH. No, sir. We have already designed for the 30,000 pounds, so if the DSARC said press with 30,000 pounds, we have done that work already. We have not done the work for 37,000 because the law prohibits that.

What we are saying is that we would like to proceed with that 37,000 pound work, and then if the DSARC says go 37,000, we are ready, or if it says go 30,000, we are ready.

So we would at least like the flexibility for the single warhead.

Now, with regard to the multiple warhead, we are not going to bend any tin between now and December on a multiple warhead missile. We are only going to do studies, and we can do that regardless of what the law says. So in a legal sense, at least the minimum situation in my estimation is to give us the flexibility to proceed forward with the 37,000- to 40,000- pound design work.

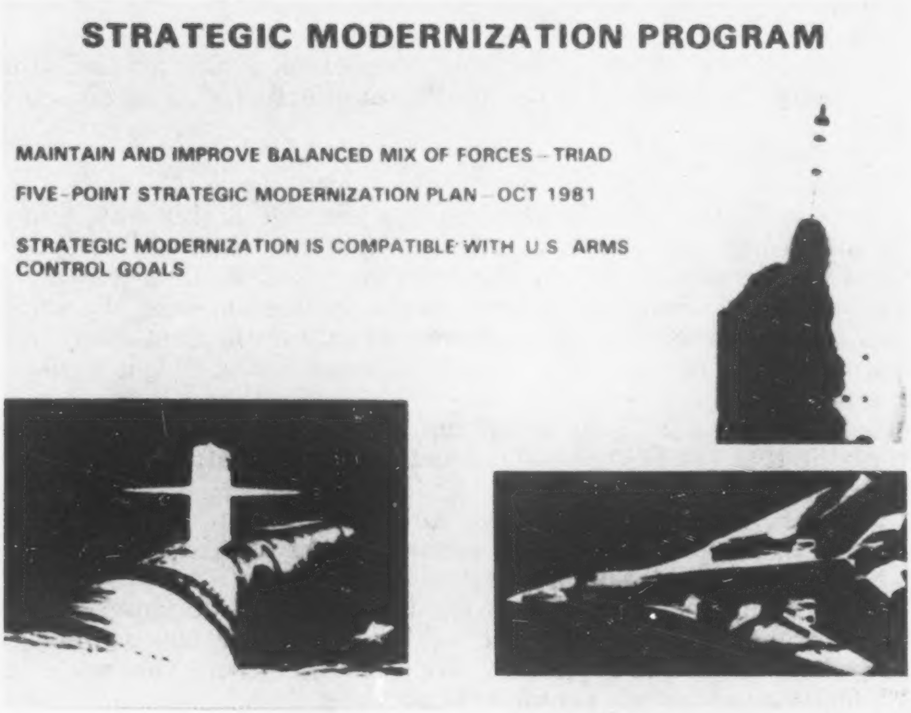
Senator WARNER. Even though the DSARC may eventually decide on another configuration.

General RANDOLPH. Yes, sir, the DSARC may indeed eventually decide, but that then allows that decision to be made in either case and then proceed forward at all due speed.

Senator WARNER. I think we are pretty much all saying the same thing. I believe I understand.

All right, now, let us proceed once again, General, with your presentation.

General MAY. All right, sir.



STRATEGIC MODERNIZATION PROGRAM

MAINTAIN AND IMPROVE BALANCED MIX OF FORCES – TRIAD

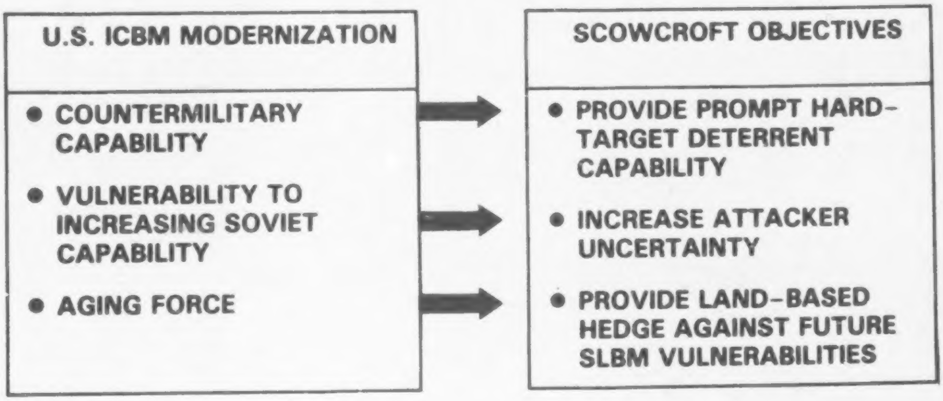
FIVE-POINT STRATEGIC MODERNIZATION PLAN – OCT 1981

STRATEGIC MODERNIZATION IS COMPATIBLE WITH U.S. ARMS CONTROL GOALS

This slide reflects the President's Strategic Modernization Program of October, 1981 which has been our basic roadmap for not only ICBM modernization but also, as General Randolph mentioned, our C^3 work as well as the two bomber programs.

UNCLASSIFIED

SCOWCROFT CONSENSUS REMAINS THE BLUEPRINT FOR ICBM MODERNIZATION



U.S. ICBM MODERNIZATION

- COUNTERMILITARY CAPABILITY
- VULNERABILITY TO INCREASING SOVIET CAPABILITY
- AGING FORCE

SCOWCROFT OBJECTIVES

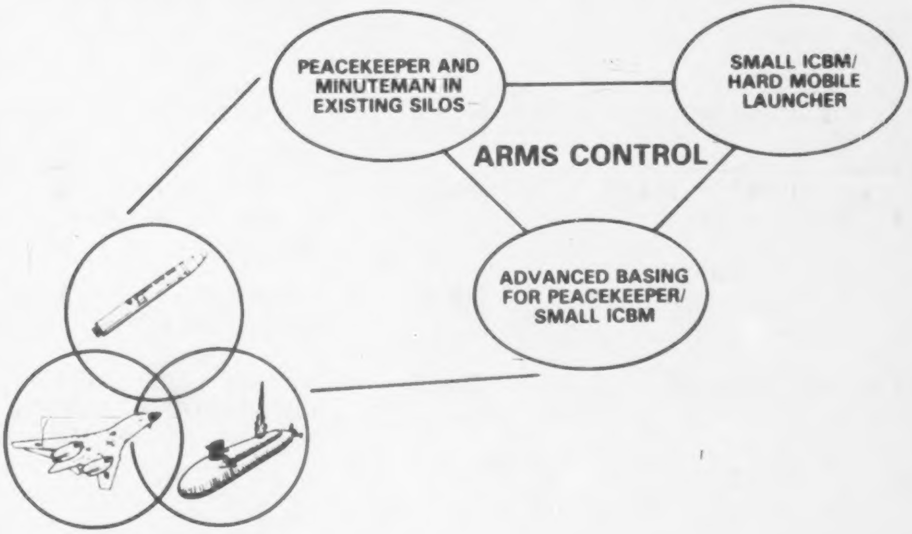
- PROVIDE PROMPT HARD-TARGET DETERRENT CAPABILITY
- INCREASE ATTACKER UNCERTAINTY
- PROVIDE LAND-BASED HEDGE AGAINST FUTURE SLBM VULNERABILITIES

UNCLASSIFIED

Subsequent to that, in the spring of 1983, the Scowcroft Commission met, signed out a report, and we today view the Scowcroft Commission consensus as our strategic roadmap in general, and specifically, our ICBM roadmap to do away with the vulnerabilities that were noted by that august group of gentlemen.

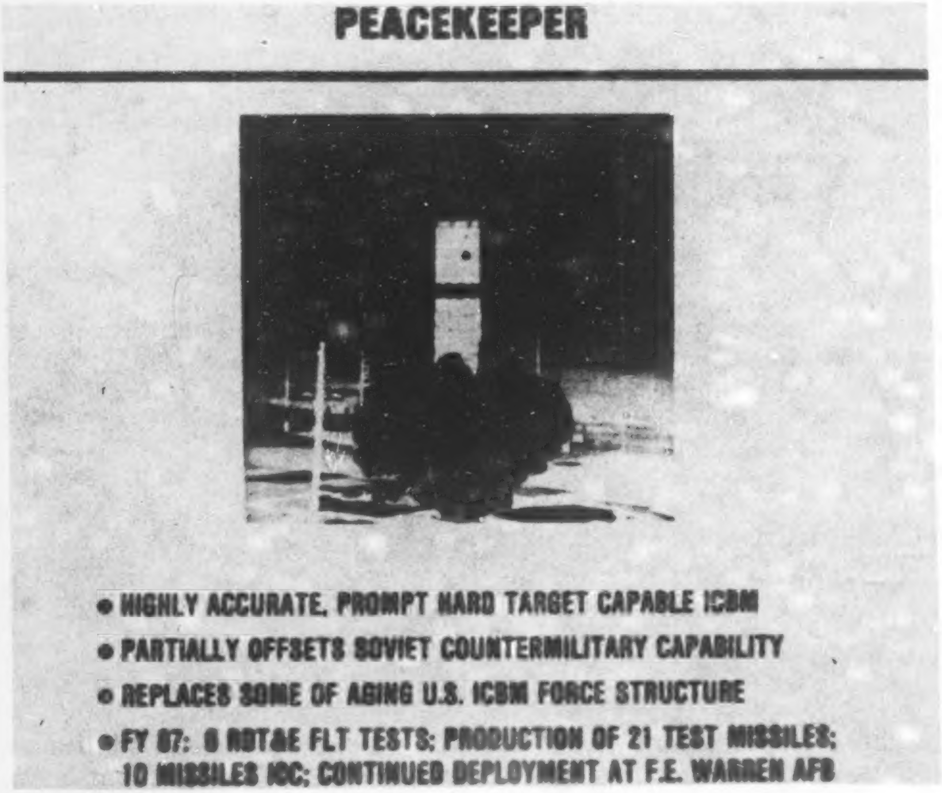
Among the Scowcroft objectives we are still attempting to implement, we understood the Scowcroft Commission report to basically talk in terms of approximately 1,500 RV's, 1,000 came out of Peacekeeper, and although they did not specify the number of small ICBM's, subsequent work has moved us in the direction of approximately 500 small ICBM's. And that remains an objective, to have a prompt hard target land based arsenal which includes 100 Peacekeepers and about 500 small ICBM's. This would increase the attacker's uncertainty and at the same time increase his certainty that if he were to attack, he would receive in retaliation a prompt, significant threat to his leadership, to his C^3 and to his own nuclear strike force. This provides a hedge not only against SLBM vulnerabilities, as the slide indicates, but also certainly to vulnerabilities in the other leg of the triad, and gives us the kind of across-the-board capability to credibly threaten the adversary, and gives the adversary tremendous challenges in terms of planning any type of attack against us. He would have multiple targets to deal with, all with different characteristics, and we think this requires the maximum resource allocation on his part.

U.S. ICBM MODERNIZATION PROGRAM


PEACEKEEPER AND MINUTEMAN IN EXISTING SILOS
SMALL ICBM/ HARD MOBILE LAUNCHER
ARMS CONTROL
ADVANCED BASING FOR PEACEKEEPER/ SMALL ICBM

U.S. TRIAD

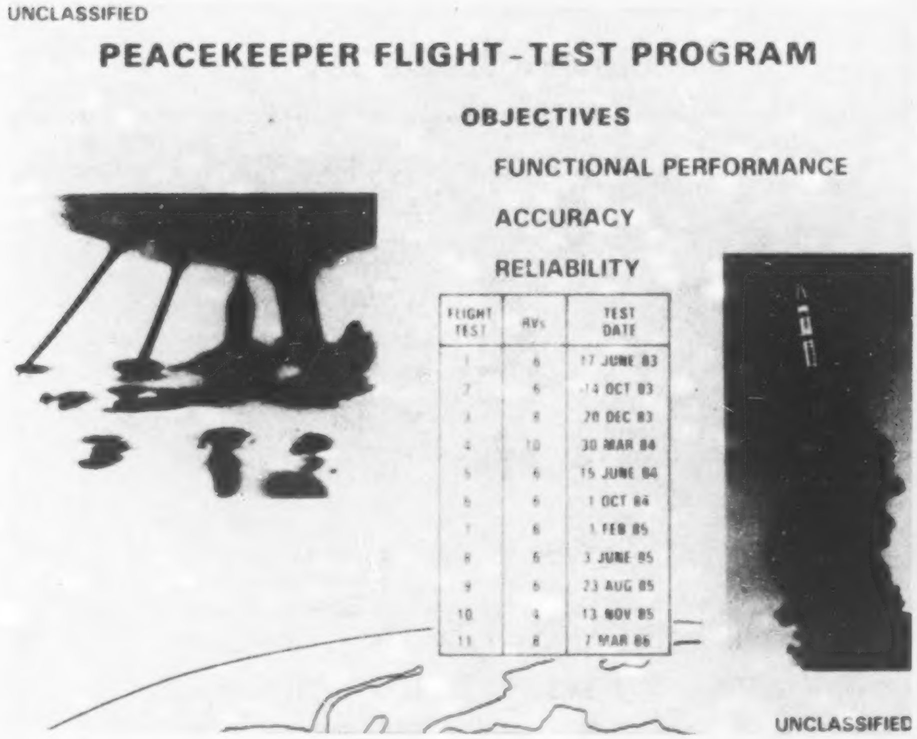
Now, out of the Scowcroft Commission we got the three tasks for the Air Force, and we are continuing to work each one of those tasks, and I will be reporting to you today on the successes we have had in 1985 and early 1986, and also talk about our programs in 1987. All are intended to reinforce U.S. arms control objectives.



PEACEKEEPER

- HIGHLY ACCURATE, PROMPT HARD TARGET CAPABLE ICBM
- PARTIALLY OFFSETS SOVIET COUNTERMILITARY CAPABILITY
- REPLACES SOME OF AGING U.S. ICBM FORCE STRUCTURE
- FY 87: 6 RDT&E FLT TESTS; PRODUCTION OF 21 TEST MISSILES; 10 MISSILES IOC; CONTINUED DEPLOYMENT AT F.E. WARREN AFB

These are the capabilities, as I mentioned earlier, for Peacekeeper. These are the major items that are going to occur in fiscal year 1987. We are supporting the final six DT&E flight tests. We are producing 21 missiles to use in our test program; 10 missiles will be on alert by December 1986, and we will be deploying an additional 20 Peacekeeper missiles during fiscal year 1987 at Warren Air Force Base.



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PEACEKEEPER FLIGHT-TEST PROGRAM

OBJECTIVES

- FUNCTIONAL PERFORMANCE
- ACCURACY
- RELIABILITY

FLIGHT TEST	RVs	TEST DATE
1	6	17 JUNE 83
2	6	14 OCT 83
3	8	20 DEC 83
4	10	30 MAR 84
5	6	15 JUNE 84
6	6	1 OCT 84
7	6	1 FEB 85
8	6	3 JUNE 85
9	6	23 AUG 85
10	4	13 NOV 85
11	8	7 MAR 86

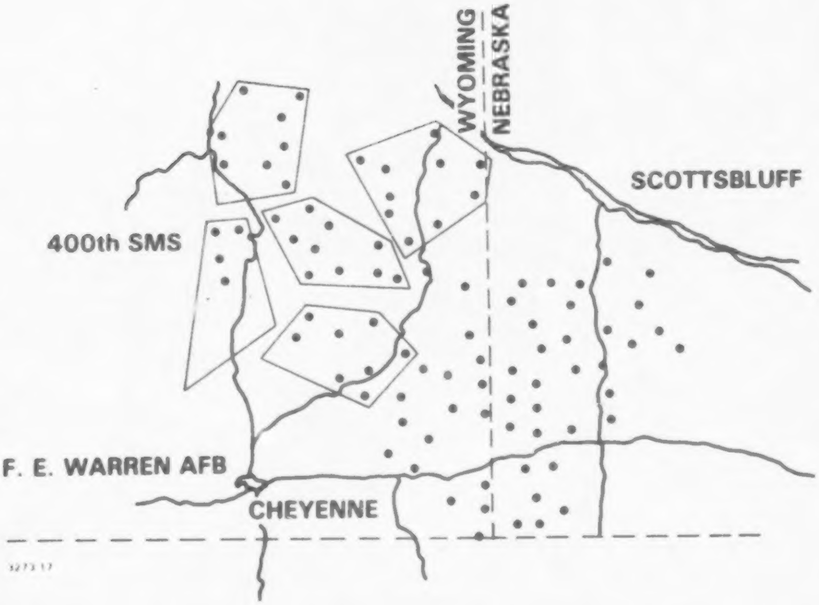
UNCLASSIFIED

Since the last time we talked, sir, we have had four additional shots, all of them, as Dr. Cooper and General Randolph mentioned, extremely successful. The eighth shot was the last above-the-ground shot. The next three were launched from reconfigured Minuteman silos at Vandenberg Air Force Base. We had the opportunity to change out the shock isolation system, to install the canister and the air elevator that goes along with the Peacekeeper missile, to build the Peacekeeper missile inside a canister, and we have been using the design software that we will be installing in our operational silos.

We have had those three silo missions, and all three of them have been extremely successful.

We continue to experience accuracy that is aproximately 33 percent better than our design requirements, and our reliability throughout this program has been extremely impressive.

PEACEKEEPER IN EXISTING SILOS: F. E. WARREN DEPLOYMENT— 50 MISSILES

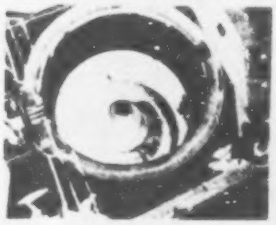


As you recall, last year we showed you sites not only in Wyoming, but also in Nebraska under the 100 in Minuteman silo program. Today we are looking at only the 400th Strategic Missile Squadron with its 50 silos located in Wyoming. The red dots on the slide indicate the 10 silos that will be on alert in December 1986 to meet our 8-year IOC commitment.

Our relationships with the Governor and the people in Wyoming are outstanding, and we are continuing to work all of the environmental impacts and the mitigation agreements with a great deal of success.

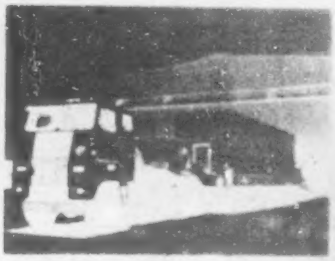
NEXT MAJOR MILESTONES

SILO MODIFICATION



A&CO STARTED JAN 86

FIRST MISSILE HARDWARE



DELIVERY TO F.E. WARREN AFB
MAY 86

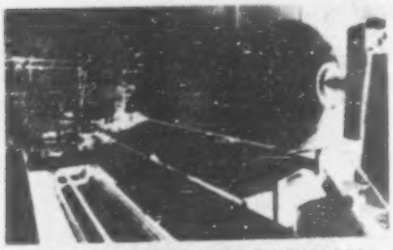
MISSILE EMPLACEMENT

FIRST MISSILES OPERATIONAL
SEPT 86
IOC DEC 86 (10 MISSILES)

The next major milestone is we took our first missile off alert, our first Minuteman III in January. Since that time we have taken two additional missiles off alert in order to begin preparing these silos for installation of the Peacekeeper missile beginning in August. Our first delivery of an entire production missile, to Warren AFB will be in May 1986. However, the first stage of that missile has already arrived.

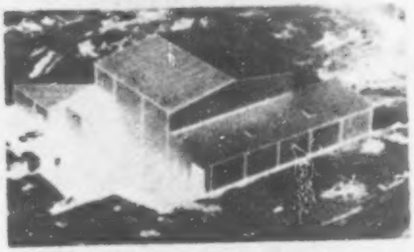
The first two missiles we expect to be operational by the end of September in 1986, supported by one launch control facility.

PEACEKEEPER PROGRAM STATUS

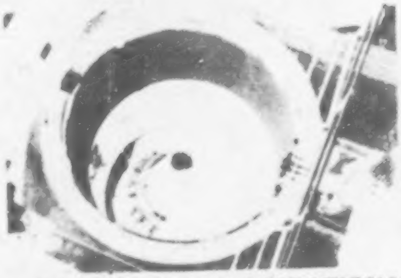


PRODUCTION UNDERWAY
(54 MISSILES AUTHORIZED)

RDT&E FLIGHT TESTS
55 PERCENT COMPLETE



CONSTRUCTION AT F. E. WARREN
ON SCHEDULE FOR IOC



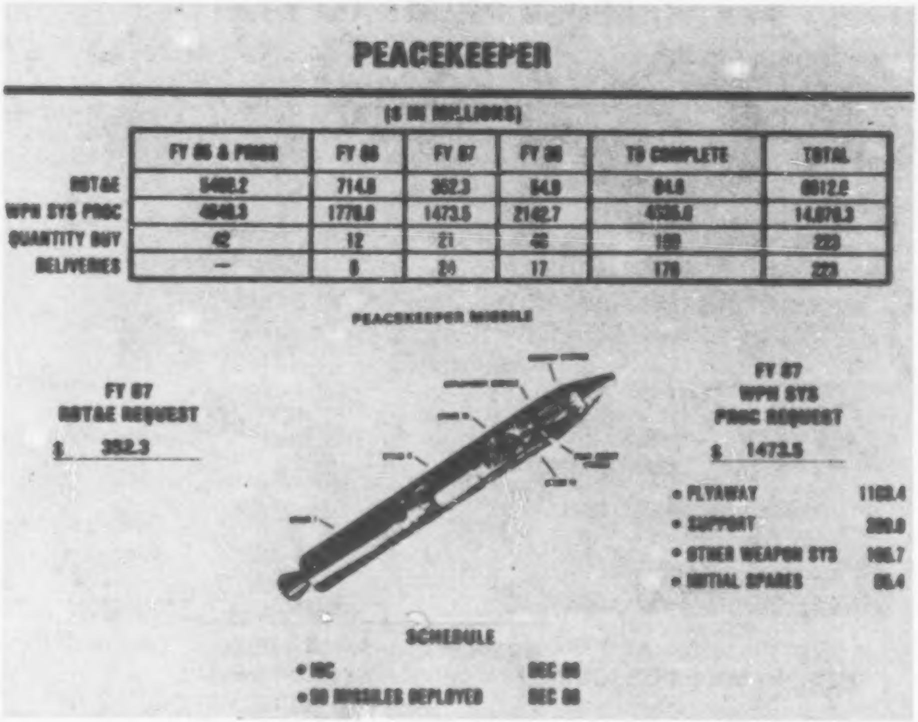
FIRST MISSILES OPERATIONAL
SEPT 1986; IOC
(10 MISSILES) DEC 1986

Today production is under way. Fifty-four missiles have been authorized by the Congress and money appropriated to procure those missiles. Fifty will be for installation at Warren AFB, and the other four will be set aside as part of our operational flight test program. We are 55 percent complete in the most successful RDT&E program that the Air Force has run to date in the intercontinental ballistic missile business, but in many senses, in any kind of Development, Test and Evaluation Program.

Another real success story is the construction that has been accomplished at Warren AFB and at Ogden, UT, which will be the depot supporting the deployment at Warren, and also at Offutt AFB, Ellsworth AFB, and Newark Air Station in Ohio. There are a total of 43 facilities that we are either constructing or renovating. Forty-two of those are on or ahead of schedule. The one that is behind schedule is only about a month behind schedule, and we do not expect any mission impact.

Most of this was accomplished by local construction organizations, and they have risen to the occasion and built superior facilities, in many cases under cost and ahead of schedule.

And finally, as I mentioned earlier, the IOC of 10 missiles is on schedule for December 1986.



PEACEKEEPER

($ IN MILLIONS)

	FY 85 & PRIOR	FY 86	FY 87	FY 88	TO COMPLETE	TOTAL
RDT&E	5408.2	714.6	352.3	64.9	84.8	6612.6
WPN SYS PROC	4848.3	1776.8	1473.5	2142.7	4535.6	14,876.3
QUANTITY BUY	42	12	21	48	100	223
DELIVERIES	—	8	20	17	178	223

PEACEKEEPER MISSILE

FY 87
RDT&E REQUEST
$ 352.3

FY 87
WPN SYS
PROC REQUEST
$ 1473.5

• FLYAWAY	1102.4
• SUPPORT	200.0
• OTHER WEAPON SYS	105.7
• INITIAL SPARES	65.4

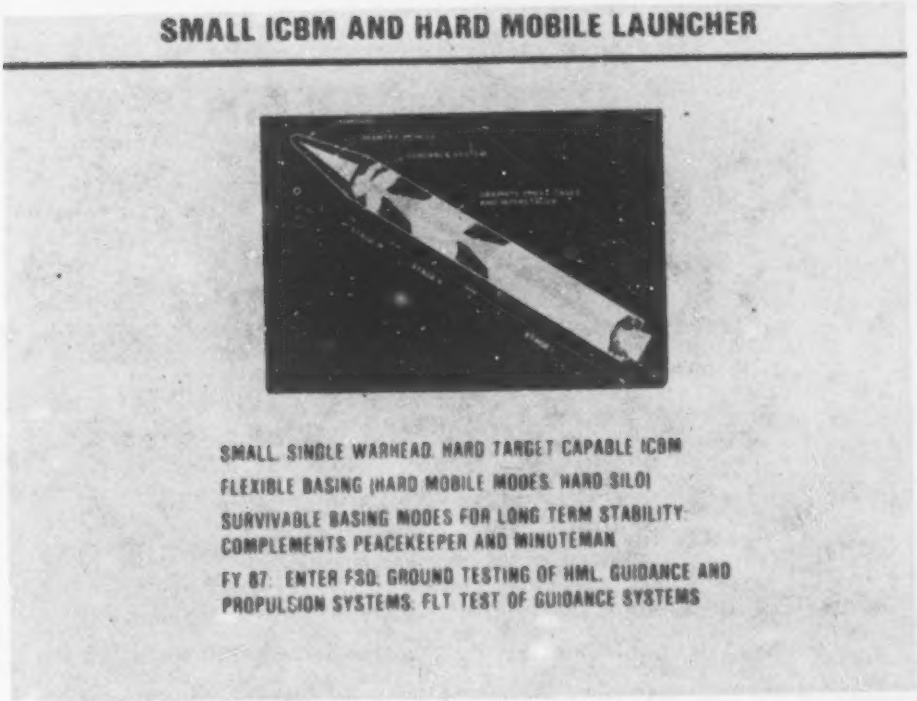
SCHEDULE

• IOC	DEC 86
• 50 MISSILES DEPLOYED	DEC 88

This chart is designed to capture our fiscal year 1987 request. We are talking about DT&E. The figures shown, $352 million, which basically pays for the final six test flights in fiscal year 1987. Three of those flights will be to complete our development program, and the last three will begin the transition to our operational test and evaluation program. We expect crews from the Strategic Air Command to turn the keys and also to accomplish all of the work associated with those flights.

Three of those flights will also be accomplished by our airborne launch control system to ensure that that works. So these six flights are extremely important to us, and they continue the very well thought out building block type of development program. We need all 20 of those missions.

As far as weapon system procurement, the fiscal year 1986 authorization language required the Air Force to come back with a program for test missiles at the rate of 12 to 21, depending upon the most efficient rate. If we procure at the rate of 21, it is approximately 25 percent cheaper than if we procure them at the rate of 12 missiles per year. The support costs basically have to do with training, logistics support and tech orders to complete that part of the program. The other weapons systems costs include some mechanical equipment and also some support for the test flights themselves.



SMALL ICBM AND HARD MOBILE LAUNCHER

SMALL, SINGLE WARHEAD, HARD TARGET CAPABLE ICBM

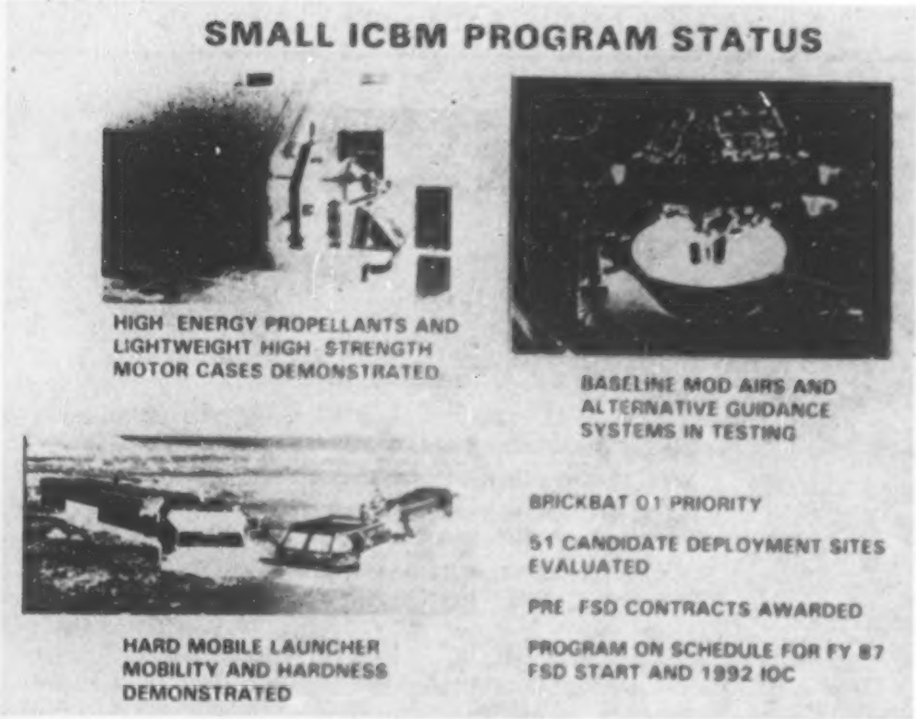
FLEXIBLE BASING (HARD MOBILE MODES, HARD SILO)

SURVIVABLE BASING MODES FOR LONG TERM STABILITY-COMPLEMENTS PEACEKEEPER AND MINUTEMAN

FY 87: ENTER FSD, GROUND TESTING OF HML, GUIDANCE AND PROPULSION SYSTEMS, FLT TEST OF GUIDANCE SYSTEMS

The small ICBM program is proceeding extremely well. It is a model acquisition program. We have learned a lot of lessons from various studies, and we have implemented those lessons, and it is paying tremendous dividends.

The things that we are going to do in 1987 is enter full scale development and begin bending metal for our hard mobile launcher. Today all we have is what we call a mobile test vehicle, but in 1987 we begin to build the hard mobile launcher itself, and we will decide on the winner of that competition sometime later this year. In fact, we will decide on the winner of all of these competitions with the exception of the guidance program. We will continue to carry at least two guidance competitors throughout fiscal year 1987.



SMALL ICBM PROGRAM STATUS

HIGH ENERGY PROPELLANTS AND LIGHTWEIGHT HIGH STRENGTH MOTOR CASES DEMONSTRATED

BASELINE MOD AIRS AND ALTERNATIVE GUIDANCE SYSTEMS IN TESTING

HARD MOBILE LAUNCHER MOBILITY AND HARDNESS DEMONSTRATED

- BRICKBAT 01 PRIORITY
- 51 CANDIDATE DEPLOYMENT SITES EVALUATED
- PRE FSD CONTRACTS AWARDED
- PROGRAM ON SCHEDULE FOR FY 87 FSD START AND 1992 IOC

Back in the days of the Scowcroft Commission there was great concern about whether or not we could find the kind of high energy propellants that would allow us to build a 30,000-pound missile that would go 6,000 nautical miles. We have now proven that technology. We are about halfway through the competitive program involving four different propulsion houses, and all their tests to date have been very successful. They have also proven that we can use graphite epoxy, a very light material compared to the Kevlar material on our Peacekeeper missile and that we can build cases that are twice as strong as we have in Peacekeeper but weigh less.

The same thing is true for the hard mobile launcher. We talked earlier about four competitors. We are down to two. We have accepted those vehicles in January to conduct our own tests with the cooperation of the Army at the Yuma Proving Grounds, and to date these vehicles have performed very impressively. They are meeting or exceeding our requirements. Both vehicles are meeting the requirements that we established in this program, which basically says they can go 60 miles on the highway, 30 miles on unimproved surfaces, and 15 miles——

Senator WARNER. Excuse me, 60 miles per hour?

General MAY. Yes, sir.

Senator WARNER. So they can travel at a speed of 60 miles per hour on what type of highway?

General MAY. On a basic macadam highway. We didn't say——

Senator WARNER. Now, wait a minute. There is a macadam highway that goes by my farm that is full of potholes. Now, you have got to be more——

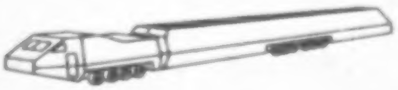
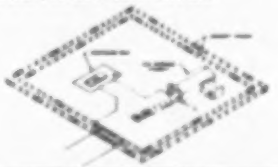
General MAY. It would probably be 45 on that.

Senator WARNER. I want to get into this point later on in questioning. I want to nail this down. I have got a special interest in this area.

General MAY. As I mentioned, the guidance system will continue the Mod airs, and the baseline system is that that we have on the Peacekeeper minus the cooling system that we have to have on the Peacekeeper because of the 10 RV system. And there are three competitors under a very aggressive alternate inertial navigation competition, and we have about $185 million on contract to conduct that competition, and we are going to narrow it down to probably two contractors by the end of the year, but continue it through test flights in fiscal year 1987 to determine the winner in the guidance system competition for the small missile. And there are the kinds of things that we continue to do to include looking for basing sites.

And I will show you on the next slide the kind of basing alternatives that we have settled on for initial operational capability.

BASING CONCEPTS

HARD ROAD MOBILE 	• DEPLOY ON DOD/DOE LAND • HARDNESS AND MOBILITY FOR SURVIVABILITY • 30 PSI OR GREATER HARDNESS
SUPERHARD SILO 	• DEPLOY ON EXISTING MINUTEMAN SITES OR NEW AREAS WITH GOOD GEOLOGY • FIXED AND MOBILE CONTROL CENTERS • SITE SECURITY LIKE MINUTEMAN
HARD MOBILE LAUNCHER ON EXISTING SILO SITES 	• DEPLOY ON EXISTING MINUTEMAN LAUNCH FACILITIES • RAPID DISPERSAL AT HIGH DEFCON LEVELS • SITE SECURITY LIKE MINUTEMAN

Of course, the first is the hard road mobile, and we spent most of our time talking about it today. We plan to deploy it on DOD/DOE land. We have narrowed down from 4,200 sites to 24 sites. We are presently conducting a legislative EIS on those sites, and we expect to report to the Congress as directed 30 days prior to the time that the Secretary of Defense makes the decision on the small missile basing selection.

These are the kinds of hardness that we understand today very well. We think we can build a hard mobile launcher between 30 and 50 psi. We are doing trade studies to determine whether there is any advantage to go up to 50 as opposed to 30 psi, or whether the delta is worth the additional cost.

We also continue to carry superhard silos as a basing alternative for the small missile, and we understand, we think, all that we need to know about how to build, as the authorization language required last year, austere, superhard silos.

And finally, an excursion to take a hard mobile launcher and not only base it potentially on DOD/DOE land, but also to base it on Minuteman sites. This would involve building some sort of a garage to base the missile hard mobile launcher in that facility and using that facility in order to increase the price to attack for a potential adversary.

Senator **Warner**. We have to vote.

Mr. Levin, what is your pleasure?

Senator **Levin**. Whatever you want to do.

Senator **Warner**. I very much want to return, so it is a question whether we should go now, which I think would probably be wise, and come back and proceed with the balance of the hearing.

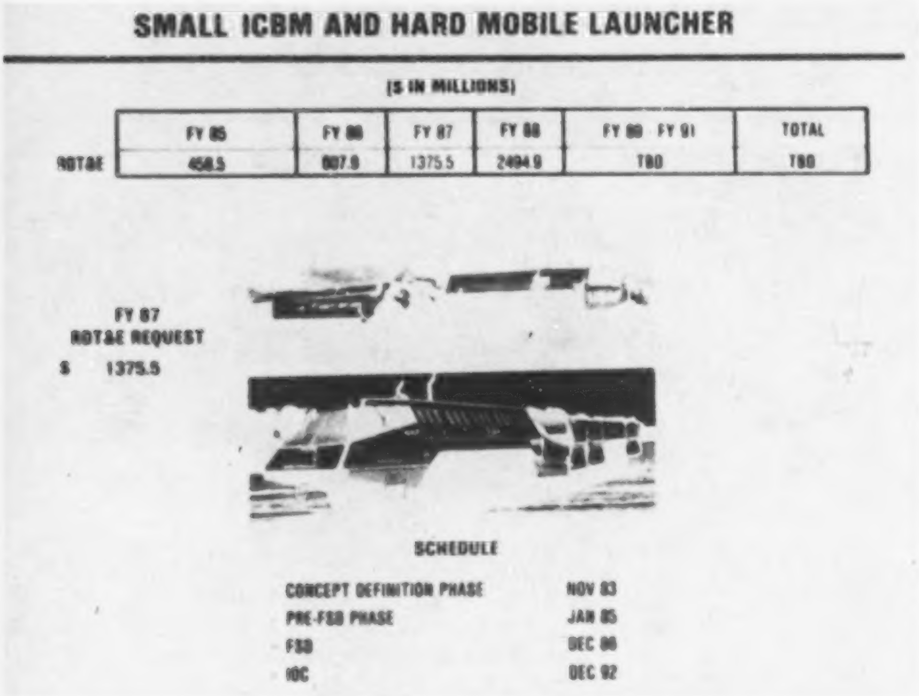
So we will recess in the hopes that we can be back here in 10 minutes.

[A brief recess was taken.]

Senator **Levin** [presiding]. How much longer do you have?

General **May**. About 5 minutes, sir. I will just flip through them quickly.

Senator **Levin**. Thank you.



SMALL ICBM AND HARD MOBILE LAUNCHER

($ IN MILLIONS)

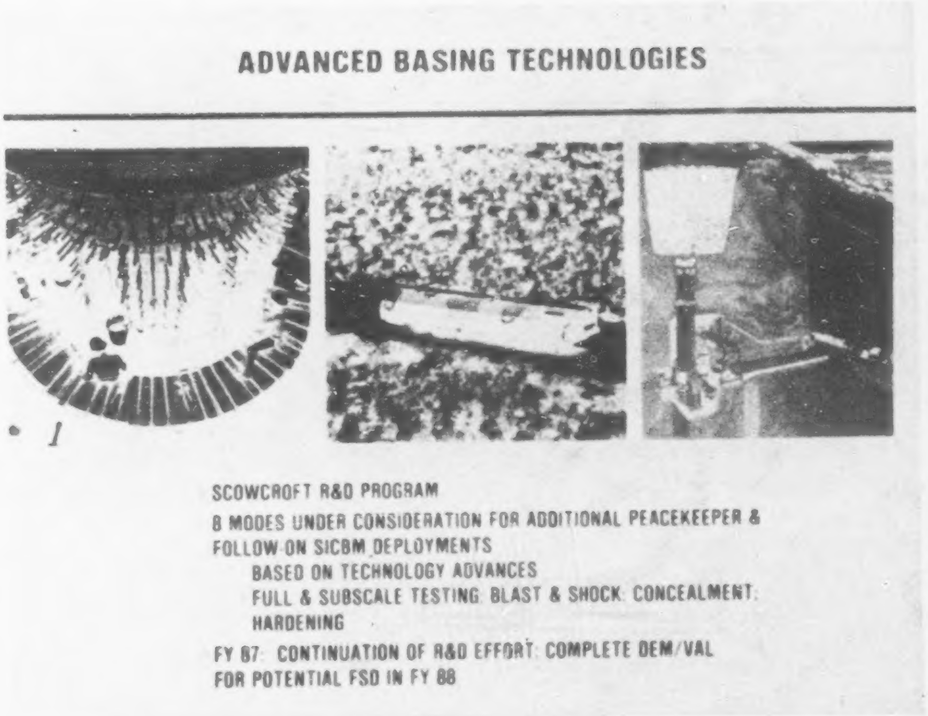
	FY 85	FY 86	FY 87	FY 88	FY 89 - FY 91	TOTAL
RDT&E	458.5	607.9	1375.5	2494.9	TBD	TBD

FY 87
RDT&E REQUEST
$ 1375.5

SCHEDULE

CONCEPT DEFINITION PHASE	NOV 83
PRE-FSD PHASE	JAN 85
FSD	DEC 86
IOC	DEC 92

General MAY. This is the money, approximately $1.4 billion, that we have in the small missile program for FSD in fiscal year 1987, and that will basically be to start turning the hardware, the preproduction models that we need in order to build that missile.



ADVANCED BASING TECHNOLOGIES

SCOWCROFT R&D PROGRAM

8 MODES UNDER CONSIDERATION FOR ADDITIONAL PEACEKEEPER & FOLLOW-ON SICBM DEPLOYMENTS

- BASED ON TECHNOLOGY ADVANCES
- FULL & SUBSCALE TESTING: BLAST & SHOCK: CONCEALMENT: HARDENING

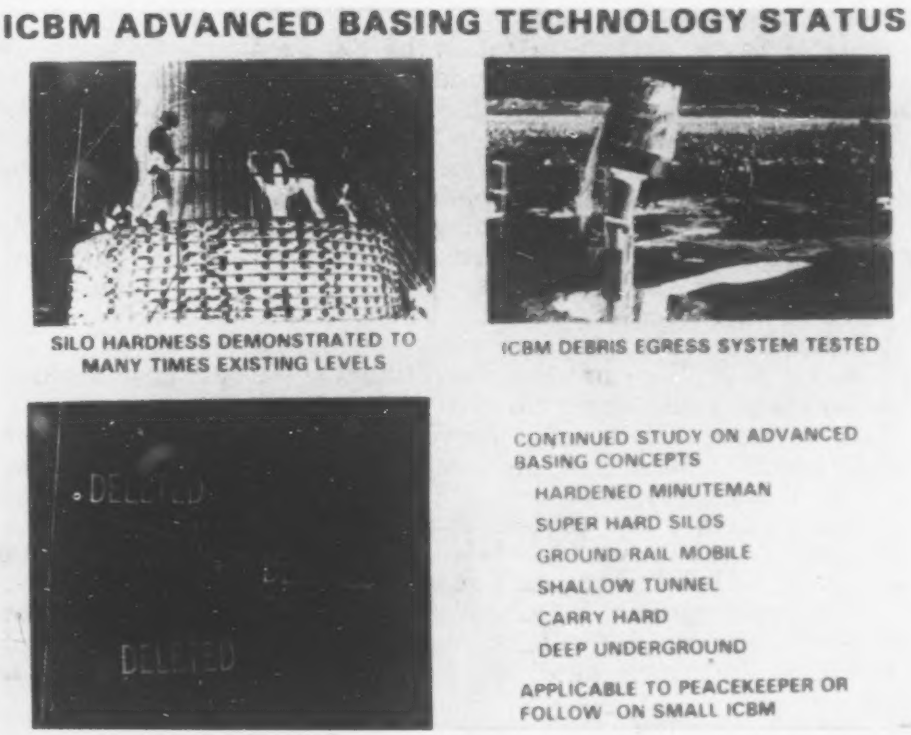
FY 87: CONTINUATION OF R&D EFFORT: COMPLETE DEM/VAL FOR POTENTIAL FSD IN FY 88

Senator LEVIN. Did you hear the testimony earlier this morning about the options you are looking at in proceeding with full scale development this fiscal year?

General MAY. I am familiar with some parts of it, sir.

Dr. COOPER. We did not hear the testimony. We were not in the room.

General MAY. This is the third part of the Scowcroft task, the roadmap that the Scowcroft Commission provided to the Air Force, and advanced basing technologies has taken on a new flavor in fiscal year 1987. We not only are beginning to explore different advanced basing technologies, but also to look closely at the question of an alternate basing mode for additional Peacekeeper missiles, and we put money in the budget in order to look at those particular possibilities.



ICBM ADVANCED BASING TECHNOLOGY STATUS

SILO HARDNESS DEMONSTRATED TO MANY TIMES EXISTING LEVELS

ICBM DEBRIS EGRESS SYSTEM TESTED

DELETED

DELETED

CONTINUED STUDY ON ADVANCED BASING CONCEPTS
- HARDENED MINUTEMAN
- SUPER HARD SILOS
- GROUND RAIL MOBILE
- SHALLOW TUNNEL
- CARRY HARD
- DEEP UNDERGROUND

APPLICABLE TO PEACEKEEPER OR FOLLOW ON SMALL ICBM

The possibilities are listed here on the slide. There are actually eight on the slide because we had two variants of the superhard silo, one with concealment and one just having 50 silos and 50 missiles, and we also have a ground and a rail mobile variant.

Senator LEVIN. Which ones of those are consistent with SALT?

General MAY. The superhard silos, either one, could violate SALT. In fact, it is possible that a hardened Minuteman silo, depending on how hard we want to make it, could go beyond the volumetric constraints of SALT.

Senator LEVIN. You have listed on that continued study on advanced basing concept chart, six options, hardened Minuteman, superhard silos. Is that one or two options?

General MAY. There's two options here, sir.

Senator LEVIN. Then ground mobile?

Senator MAY. Well, ground mobile and rail mobile.

Senator LEVIN. That is two options. Shallow tunnel.

What is the next one?

General MAY. The next one is the carry hard mode. Are you familiar with that?

Senator LEVIN. Well, I am not offhand. What is that?

General MAY. Basically, the carry hard mode envisions hardening the missile and its container and moving that missile and container around among many holes in the ground, and most of the costs associated with that basing mode, in the minds of the supporters, would be associated with building the missile and its container, and it would be very inexpensive to build the hole in the ground.

And as you multiply the holes in the ground, it multiplies the aim points for the potential attacker.

Senator **Levin**. And the last item there is deep underground?

General **May**. Yes, sir. Deep underground is a program we have in the budget now. This is our third year. And it basically explores technology that we would envision considering for use in the 1990's, and it has to do with a secure reserve force, if the Nation chose to go in that direction. [Deleted.]

Senator **Levin**. Again, now, going through the entire list, identify which ones of those would violate the SALT constraint. The hardened Minuteman you said might.

General **May**. It could, yes, sir.

Senator **Levin**. Both superhard silos would?

General **May**. We can't build additional silos, but these are considered shelters and under current interpretation are allowed.

Senator **Levin**. Or increase the volume of the existing over a certain amount.

General **May**. Yes, sir.

Senator **Levin**. Now, what about the other options?

General **May**. To my knowledge, the ground rail mobile would not violate SALT. It depends, I guess, on deep underground whether or not you consider it to be a violation of the silo restrictions, and I am not sure. We will have to submit for the record on shallow tunnel and carry hard, sir. I just don't know the answer to that.

Senator **Levin**. Does Dr. Cooper?

Dr. **Cooper**. I don't know either, Senator. Carry hard I am sure would be debatable on that with building the numbers of holes that could be considered silos.

Senator **Levin**. And what about shallow tunnel?

Dr. **Cooper**. That I don't know.

Senator **Levin**. Would you supply that for the record, then, also?

Dr. **Cooper**. Yes; we will.

[The information follows:]

SALT Constraints

The Air Force is investigating several alternative basing modes for deployment of additional Peacekeepers and/or small ICBMs in follow-on basing modes. Consideration of these alternatives is driven by technological considerations, and other factors including the U.S. policy of interim restraint, current arms negotiating positions, any possible treaty resulting from the negotiations, and also the policy of no undercut of existing arms control agreements:

Peacekeeper in existing Minuteman III silos: Deployment of fifty additional Peacekeepers in existing silos is fully consistent with existing arms control agreements.

Peacekeeper in hardened Minuteman III silos: This mode can be fully consistent with existing agreements. Modernization, to include hardening, of existing silos is allowed under SALT II as long as internal silo volume does not increase by more than 32 percent. Conventional hardening techniques can increase our existing silo hardness by a factor of 10 or more without impacting these restrictions.

Superhard shelters with or without concealment: This mode would be compatible if the transportable missile canisters are designated as "launchers" and adequate measures are provided to assure verification of the number of launchers within the superhard shelter complex.

Rail mobile and ground mobile: These mobile basing modes are not prohibited by existing agreements and would be compatible providing SALT verification provisions are met.

Shallow tunnel: This mobile/concealed basing concept could be compatible with existing agreements providing adequate measures for verification of the number of deployed launchers are developed.

Carry hard basing: This mode would be compatible if the mobile carry hard canisters are designated as "launchers" and adequate measures are provided to assure verification of the number of launchers within the carry hard complex.

Deep underground basing: This mode is considered a technologically new concept not explicitly prohibited by the SALT agreements. It probably would be compatible providing adequate measures are included to assure verification of the number of deployed launchers.

General May. We have had tremendous success in the silo hardness program compared to what we know. This is an outgrowth of the Scowcroft Program. We now think we can build silos that are 25 to 40 times harder than our present Minuteman silos. We have demonstrated that we can get out of those silos if we chose land-based systems, and we also have shown that deep basing is certainly something we can technologically do.

Senator Levin. You said 25 to 40 times the hardness? Is that what you said?

General May. Of our present Minuteman silos.

Senator Levin. In which of those would you get that much greater hardness?

General May. We are basically talking about the superhard silos. Those are the ones that we have tested. Those are the ones that we have spent time and money on over the past 3 years. We really haven't done the same level of testing for shallow tunnel and carry hard. We have a good understanding about how hard we can make Minuteman silos, and it is basically a matter of how much you want to spend, and you get to the point where you would decide economically to build a superhard silo rather than continuing to upgrade your Minuteman silos.

Senator Levin. OK, now, if the superhard would be 25 to 40 times greater than existing silo hardness, what would the hardened Minuteman range be?

General May. I'm sorry, sir?

Senator Levin. I thought that you said that the superhard improvement over existing silos would be 25 to 40 times.

General May. Yes, sir.

Senator Levin. What would the hardened Minuteman improvement in hardness be?

General May. How many times over the present? Approximately 10 times harder.

Senator Levin. We are in open session, are we?

General May. Yes, sir.

Senator Levin. Is it then fair to conclude that the maximum increase in hardness that we can achieve consistent with SALT is somewhere in the area of 10 times?

General May. I am not sure I can answer that, sir, because I think the volume that we associate with that particular version, the 10 times the Minuteman today could violate SALT, and I do not know exactly what the percentage, or what the increase would be, and we will supply that for the record, sir.

[The information follows:]

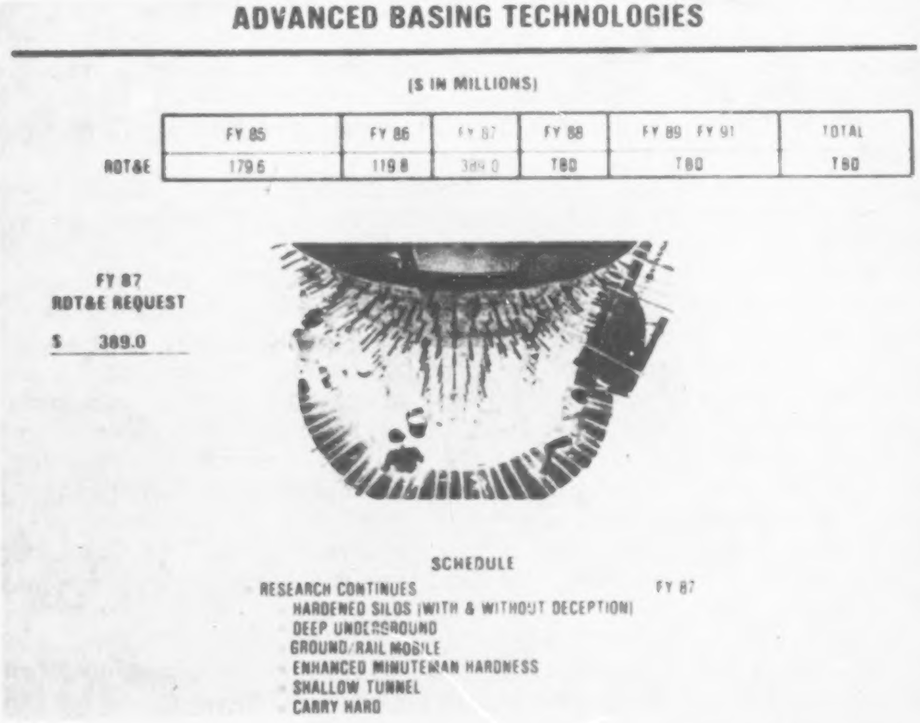
Increase in Hardness

General May. Estimating increased hardness values for Minuteman silos depends on the type of missile installed. It has been estimated that an existing Minuteman silo containing a Minuteman missile could be hardened to approximately [deleted] psi within arms control constraints. The increased hardness achievable for Minuteman silos containing Peacekeepers would be comparable. The increased hardness achievable for those containing small ICBMs would be greater.

Senator Levin. But I said the maximum would be 10 times, consistent with SALT, and that may be inconsistent with SALT?

General May. That may violate SALT also.

Senator Levin. OK.



ADVANCED BASING TECHNOLOGIES

($ IN MILLIONS)

	FY 85	FY 86	FY 87	FY 88	FY 89 FY 91	TOTAL
RDT&E	179.6	119.8	389.0	TBD	TBD	TBD

FY 87
RDT&E REQUEST
$ 389.0

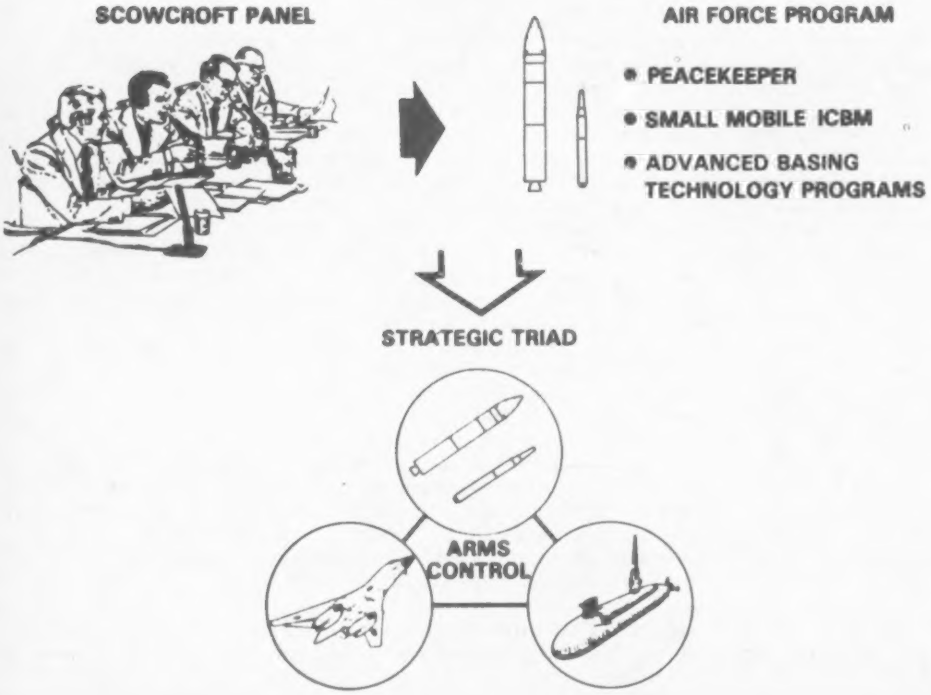
SCHEDULE

- RESEARCH CONTINUES FY 87
  - HARDENED SILOS (WITH & WITHOUT DECEPTION)
  - DEEP UNDERGROUND
  - GROUND/RAIL MOBILE
  - ENHANCED MINUTEMAN HARDNESS
  - SHALLOW TUNNEL
  - CARRY HARD

General May. And basically, that is the money; $20 million of that is in there for deep underground basing. And $369 million is in there to continue the Advanced Basing Technology Program and also put us in the position of making a decision no earlier than December 1986 on a follow-on basing mode or modes for additional Peacekeepers.

This would provide the money to do a full-scale development program.

SUMMARY



SCOWCROFT PANEL

AIR FORCE PROGRAM

- PEACEKEEPER
- SMALL MOBILE ICBM
- ADVANCED BASING TECHNOLOGY PROGRAMS

STRATEGIC TRIAD

ARMS CONTROL

In summary, we are continuing to carry out the road map provided by the Scowcroft consensus. We are working these three programs, and we are working to improve overall the strategic triad.

Thank you very much, sir.

[The prepared statement of General May follows:]

Prepared Statement of Brig. Gen. Charles A. May, Jr., Deputy Director and Special Assistant for ICBM Modernization, Directorate of Operational Requirements, DCS/RD&A

Mr. Chairman and members of the committee, it is my pleasure to be here today to report on the ICBM Modernization Program. We continued to make progress in 1985. The program consists of three complementary and reinforcing elements that greatly improve the near- and long-term U.S. deterrent capability. These include deployment of Peacekeeper missiles, development of the Small ICBM, and research and development of advanced ICBM basing technology. Before reviewing the accomplishments to date and the goals of the FY 1986 and FY 1987 programs, I would like to discuss the importance of ICBM modernization.

Our strategic Triad of bombers, land-based missiles, and submarine-based missiles is based on the concept that while no leg of the Triad individually provides both the necessary military capability and survivability to meet the Soviet threat, the combination of forces so complicates and confounds Soviet attack plans that a substantial, potent, and reliable retaliatory force is always available.

ICBMs make unique contributions to the deterrent effectiveness of the strategic Triad. ICBMs are highly accurate and responsive; have reliable, real-time communications with command authorities; provide flexible retargeting capability; offer alert rates that approach 100 percent; and, cost significantly less to operate than other elements of the Triad. The other legs of the Triad have unique qualities as well; for example, bombers can be recalled once launched, and submarines are more secure than land-based forces on ground alert. Indeed, each leg of the Triad not only complements the strengths of the other two, but also compensates for their weaknesses.

Finally, the complex nature of our strategic forces make it very unattractive for the Soviets to concentrate on overcoming either a single Triad element or the Triad as a whole.

The Soviets have improved their military posture the last 15 years in two important ways that affect U.S. ICBMs. First, they have increased the survivability of their most valued strategic assets—ICBM silos, command and control centers, and leadership facilities—by hardening them appreciably. Second, deployment of SS-18s and SS-19s has provided the Soviet Union with the theoretical capability to threaten U.S. assets as they are currently hardened. This has placed a large portion of the Soviets' key strategic assets in virtual sanctuary from any possible U.S. threat. The result is a dangerously destabilizing situation in which the smaller U.S. ICBM force remains at risk against a much larger Soviet force without the proper hard target capability to threaten a significant portion of these key Soviet assets.

These developments led to the requirement to upgrade our ICBM force in two significant ways. First, to improve our capability to place at risk critical targets in the Soviet Union that have been hardened; and, second, to increase the survivability of a portion of our ICBM components. One of the key findings of the 1983 Scowcroft Commission was that, by trying to meet these separate requirements with a single missile in a single basing mode, we had made the problem of modernizing the ICBM force "virtually insoluble." This recognition resulted in the Commission's recommendation for deployment of both Peacekeeper in Minuteman silos for near-term military capability and subsequently the development of the Small ICBM in a survivable basing mode to enhance survivability and stability in the longer term.

Together, these two programs have become the centerpiece of our ICBM Modernization Program. These programs also represent an evolutionary response to changing U.S. strategic doctrine, which is placing a greater emphasis on deploying more flexible and survivable weapon systems to retain and improve deterrence. This policy has evolved as a result of changing Soviet threat, technological developments, and a requirement for flexible targeting options to deter Soviet aggression under varying circumstances.

Current U.S. strategic policy requires the United States to be capable of responding to Soviet aggression in a measured and restrained way if need be. This policy grew from the realization that a massive nuclear retaliation by the U.S., as the only option, would be an inappropriate response to a limited Soviet attack, and probably would only invite a similar Soviet response. Thus, the U.S. might be self-deterred from retaliating, regardless of the circumstances.

U.S. strategic policy also includes extending the U.S. nuclear umbrella to our allies. This requires U.S. strategic forces to possess the range of retaliatory capability to respond in a prompt, controlled, and limited manner against a range of critical hardened Soviet targets. This capability is required to persuade the Soviets that hostilities, regardless of intensity, would be futile. This is the essence of deterrence and it applies to the defense of our allies as well as ourselves.

The ICBM leg of the Triad, modernized with the Peacekeeper and Small ICBM, is uniquely suited to provide a full range of retaliatory options in support of our deterrent policy. The Peacekeeper missile's outstanding accuracy enhances our ability to meet the threat at every level. The Small ICBM will add to this and provide greater stability because of its single warhead and postattack survivability.

Just as there are distinct advantages to a diverse Triad of forces, there are significant advantages to a diverse ICBM force. By deploying the Peacekeeper and Small ICBM, and basing them in different modes, the survivability of the ICBM force as a whole is improved and its flexibility increased. Enhancing our force structure in this manner confounds the Soviets even more and make any form of a first strike highly undesirable. In this fashion, the dual deployment of Peacekeeper and Small ICBM make a invaluable contribution to our deterrent posture.

At this point, I would like to review the progress made in the ICBM Modernization Program to date and outline our plans for the remainder of FY 1986 and FY 1987.

PEACEKEEPER

As you know, according to the FY 86 DOD Authorization Act, "the number of M-X missiles deployed at any time in existing Minuteman silos may not exceed 50 . . . unless a basing mode for the M-X missile other than existing Minuteman silos is specifically authorized by legislation. . . ."

In accordance with legislation, we have revised the plan to deploy 100 missiles in two separate squadrons of 50 to one squadron, the 400th SMS at F.E. Warren AFB. This program to deploy 50 Peacekeepers remains on schedule for the December 1986 initial operational capability, although some schedule revisions were made as a consequence of the limit of 50 missiles. The Secretary of Defense has also directed the Air Force to develop a research effort to examine other basing modes for an additional 50 Peacekeeper missiles.

Eleven of the 20 planned Peacekeeper Research, Development, Test, and Evaluation launches have been successfully completed, including flight tests 7 through 10 in 1985. Testing continues to provide high confidence that the Peacekeeper will meet the required weapon system performance and accuracy goals by IOC. Phase II of the RDT&E testing (flight tests 6–13) continued successfully in 1985, measuring missile and reentry vehicle capabilities, and testing silo, missile, and ground support equipment integration. Flight tests 9 (August 1985), 10 (November 1985), and 11 (March 1986) were all launched successfully from a modified Minuteman III silo at Vandenburg AFB, increasing our confidence in the operational capability of this system.

Other major accomplishments in 1985 included the award of contracts for the FY 85 production missiles and related support equipment, and for RDT&E activities, including missile guidance and propulsion tests and Peacekeeper basing system tests. Significant progress was also made in developing command, control, and communications systems to support Peacekeeper, including an airborne launch control capability common to both Peacekeeper and Minuteman.

Construction of roads, utilities, and support facilities at F.E. Warren AFB continued in 1985 and is now over 75 percent complete. The contract for Peacekeeper Assembly and Checkout, which supports silo modifications and missile assembly, was awarded in February 1985. Operational silo modifications began this January, leading to an IOC of 10 missiles in December of this year. Deployment of the 50 missiles in existing silos is scheduled to be completed by December 1988.

For 1987, the Air Force has requested $352.3 million for Peacekeeper RDT&E activities. These include systems engineering, final nuclear hardness and survivability testing, guidance system qualification testing, close-out of the production contracts, logistics support, basing support equipment, and ths six scheduled RDT&E flight tests, flights 15 through 20, including post-flight data analyses. We are also planning to begin the development of a second source for the inertial measurement unit, which we expect will provide significant long-term cost savings and ensure a continued supply of parts over the life cycle of the system.

The FY 87 Peacekeeper procurement request is for 21 test missiles. This is in accordance with FY 86 congressional action, which limited Peacekeeper procurement of between 12 and 21 test missiles "depending on the most efficient production rate." Our production cost estimates show that 21 is clearly the more efficient rate and will save about 25 percent per missile in unit costs and in the long run will save over $4 billion in total program costs versus the rate of 12 per year. It should be pointed out, however, that our production capacity is sized for 48 missiles per year. The savings at this rate (48) would be nearly 60 percent per unit and over $7 billion saved in total program cost versus 12 per year.

It should also be pointed out that the 21 missiles are strictly test missiles to be used in our test program—no warheads are being procured for them which is prohibited by the FY 86 authorization bill. Ultimately we will need 123 such test missiles to support Peacekeeper over its 15 year design life. These missiles are needed because ICBMs, unlike aircraft which are regularly flown, sit on alert in silos for extended periods. To assure our ICBMs can perform their mission with high confidence, we must periodically flight test missiles from our operational force and replace them with spare missiles.

Our operational test program needs 108 missiles for flight testing and another 15 for aging and surveillance ground testing. This total requirement if 123 test missiles is based on providing adequate statistical confidence that Peacekeeper will continue to work and to meet JCS/CINCSAC weapon system reliability and confidence level requirements. The 123 test missiles are needed whether 50 or 100 Peacekeeper missiles are deployed.

The planned test program over Peacekeeper's 15-year design life will consist of 108 OT&E missiles (8 flight tests per year for the first 3 years after IOC and 7 per year for each of the following 12 years), and 15 Aging and Surveillance (A&S) missiles (1 per year). The OT&E program establishes and monitors weapon system reliability over the operational life cycle as well as varifying force improvement modifications. The A&S missiles enable predictive diagnosis of aging trends. This is how we found and corrected the solid propellant debonding problems in our Minuteman II missiles resulting in a program to replace (remanufacture) Stages II and III.

Overall, the Peacekeeper operational test program is austere relative to other U.S. missile test programs: while Peacekeeper will use 108 OT&E missiles, Minuteman I used 210; Minuteman II, 171; Minuteman III, 248. In two separate reviews (May 1985 and January 1986), the Congressional Budget Office concluded the Peacekeeper test missile program is considered "modest" compared to other missile test programs.

Four test missiles were authorized in FY 86. While we still need 119 test missiles to support our deployed force and would normally request these at the most economic rate of 48 as we did in FY 86, we are requesting only 21 in FY 87 because this quantity is the most economic rate allowed under current legislation. The $1.473 billion requested includes $55.4 million for initial spares.

SMALL ICBM AND HARD MOBILE LAUNCHER

We made significant progress with the Small ICBM and Hard Mobile Launcher (HML) during the past year. The Air Force completed Phase I—Concept Definition—of the acquisition process and began Phase II: Pre-Full-Scale Development. Contracts have been awarded for weapon system assembly, test, and system support; missile ordinance firing system; propulsion development; weapon control systems concepts; HML concepts; and guidance and control systems, including Alternate Inertial Navigation Systems. A missile with a 6,000-nautical-mile range for a 1,000-pound throwweight that weighs no more than 30,000 pounds is feasible. Initial tests of high-energy propellants, high-strength motor cases, and accurate guidance and control subsystems have demonstrated that the required performance is achievable with low to moderate risk.

The Small ICBM propulsion concept-definition phase ended in February 1985 with the award of contracts to two competing contractors for each of the three stages. Each contractor continued to validate the technologies needed to meet baseline performance for the Small ICBM. During 1985, successful full-scale motor firings demonstrated the feasibility of high-energy propellants, and burst tests validated the use of lightweight, high-strength motor cases. Each contractor will test three full-size prototype Small ICBM motors and burst-test three to eight motor cases in 1986.

In January 1985, two of the four HML concept-definition competitors were selected to continue competition during the pre-FSD phase. Their studies and tests confirmed that Hard Mobile Launcher designs can meet hardness and mobility requirements. This is bases on concept evaluations using scale models in blast tube tests and in nuclear blast simulation tests above ground. Both HML contractors constructed full-size HML mobility test vehicles, which have completed field tests at the contractors' facilities. Air Force field-testing of the mobility test vehicles began in January 1986.

The Air Force Nuclear Criteria Group and the Defense Nuclear Agency (DNA) have continued to define the nuclear environment for HML development. The Air Force and DNA have also developed simulators to generate airblast environments for testing HML designs.

Small ICBM development is characterized currently by vigorous industry competition on the HML, the weapon control system, alternative guidance and control designs, and the propulsion stages. This will lead to a firm weapon system baseline design and basing mode alternatives to support a full-scale development and basing mode selection decision later this year. Full-scale development is scheduled to begin in the first quarter of FY 87, leading to missile flight-testing in early 1989 and IOC in December 1992, in accordance with the FY 84 DOD Authorization Act (Price Amendment).

In order to assist the area selection and basing mode decisions associated with entering FSD, the Air Force is preparing a Legislative Environmental Impact Statement, which will determine if there are any significant environmental impacts which may be created as a result of deploying the Small ICBM at various candidate deployment areas in different regions of the country. To date 4,200 installations have been screened, 51 have been visited and studied in detail, and 24 remain as candidates, including the 6 existing Minuteman complexes.

The FY 1987 Small ICBM RDT&E request of $1.375 billion represents the funds needed to begin full-scale development of this major weapon system. This includes awarding all the FSD contracts, designing and testing the FSD propulsion and guidance systems, flight testing two candidate guidance systems on Minuteman missiles, designing and testing the FSD Hard Mobile Launcher vehicles, and initiating more detailed, site-specific environmental studies.

ADVANCED BASING TECHNOLOGY

Advanced basing technology efforts continued in 1985 with encouraging results in the areas of silo hardening and deep basing. Eight different basing modes are now under evaluation. These are applicable to follow-on Peacekeeper or Small ICBM deployments.

Our silo hardening program continued with very promising results in 1985. Four major silo hardness tests using scale models were successfully conducted at the Luke Air Force Bombing and Gunnery Range near Yuma, Arizona. Results from these tests indicate that it is possible to harden silos to levels over 50 times greater than existing silo hardness. Testing and analysis of silo designs continue, with focus on reducing costs, risk, and lead time. These activities support the research for an alternative basing mode or modes for Peacekeeper and/or the Small ICBM.

Reevaluation of high-yield nucler craters in the Pacific, coupled with results of a May 1985 simulated nuclear cratering test, indicate that contrary to earlier theories, smaller craters and reduced ground motions can be expected for dry continental U.S. geologies. An October 1985 DNA test in an underground cavity further supported this downward revision of crater-related effects. These findings further enhance the potential of hardened silo as a future ICBM basing mode.

Conceptual studies and supporting technology activities for deep basing continued at a relatively low level of effort. In 1985, a plan for a 5-year advanced R&D program to support a late-1990s deep basing option, including program objectives and milestones, was submitted to the Congress.

In 1986 the Air Force will continue to study candidate basing modes for use by the Small ICBM or Peacekeeper or both. The FY 87 request will be used to continue pre-FSD development and testing of the most promising mode or modes for potential entrance of one or more modes into FSD in FY 88. FY 87 tasks include conceptual design and full and subscale testing in the area of concealment, survivability, hardening, launch control, blast and shock resistance, and constructibility.

SUMMARY

In conclusion, the ICBM Modernization Program is progressing well. The Peacekeeper program is on schedule and within cost, and IOC is just 10 months away. Great progress has been made on the Small ICBM and Hard Mobile Launcher and both programs are meeting all design requirements. The Air Force is preparing to enter FSD in FY 87 to meet the Small ICBM 1992 IOC. Our Advanced Basing Technology studies show considerable promise for more survivable basing for follow-on Peacekeeper or Small ICBM deployments.

By the end of this year Peacekeeper will begin to redress the current asymmetry in prompt hard-target-kill capabilities, and a highly survivable Small ICBM system will be available in the early part of the next decade. With continued congressional support, the Air Force is confident that progress will continue, and that the ICBM Modernization Program will significantly enhance our strategic deterrence well into the next century.

Senator **Levin**. Thank you.

Any one of you can answer this question.

What would be the minimum hardness that we would need to survive in the 1990's a Soviet missile attack, given the accuracy which we project they will have in the 1990's?

General **May**. Yes, sir. That is basically a classified answer, and we would like to take that for the record.

Senator **Levin**. Even the range is classified?

General **May**. We are talking price to attack, sir, and by inference, you are indicating what accuracy we expect for the Soviets in that time period, and we are also indicating what the hardnesses of our present silos would be and so forth, and I think it would be better handled in a classified insert.

[The information follows:]

Minimum Hardness

We continue to believe, as the Scowcroft Commission pointed out, that silo vulnerability is not the dominant factor in ICBM modernization in the near term. This is due to the mutual survivability enjoyed by our ICBMs operating in tandum with our alert bomber force. In this view, Minuteman and Peacekeeper missiles in existing silos are sufficiently survivable and continue to make a vital contribution to deterrence. This will remain true in the 1990s.

In the context of isolated silo vulnerability, our studies show that hardening in general reduces vulnerability, increases attacker uncertainty, and thereby contributes to deterrence and stability. Since almost any hardening is good and other factors besides hardness contribute to survivability, we have not focused on identifying a minimum hardness.

[Deleted.] The Soviet capability to attack silos in this hardness range in the 1990s is very limited. For example [deleted]. For one-on-one attack, the survival probabilities for [deleted] respectively. This is very good survivability. In addition, the Soviets would confront difficult attack issues, including very complex timing requirements, potential RV fratricide, and probable U.S. retaliation during the attack. Because of these uncertainties, the problem of successfully attacking superhard silos will remain formidable for the foreseeable future.

Deployment of superhard silos could also force the Soviets to a dificult and costly upgrade of a portion of their ICBM force, including improved accuracies, increased yields, and perhaps advanced reentry payloads. Even after any such force improvements, considerable uncertainty in attacking superhard silos would remain.

General RANDOLPH. Senator Levin, the proposed hardnesses that we just discussed with you we believe would survive attacks in the 1990's. That is why we are proposing those hardnesses. We believe that those are adequate to survive the missiles. So——

Senator LEVIN. You are talking about 25 to 40 times.

General RANDOLPH. Yes, sir.

Senator LEVIN. And you are talking about hardnesses which are violations of SALT.

General RANDOLPH. That could be correct, yes, sir.

Senator LEVIN. So therefore you are recommending that. We no longer comply with SALT.

General RANDOLPH. No, sir, we are not recommending that. We are simply doing a study that says how do we survive the missiles.

Now, the Secretary of Defense is going to have to assess what that means and then make a recommendation to Congress. We are simply asked what are the survival modes. That is one survival mode, we think.

Senator LEVIN. So you have not made a recommendation on whether or not we ought to move in this direction?

Dr. COOPER. No, sir, and I think that is a key point. Those eight basing modes that General May showed to you are the ones that are currently being considered, and we anticipate that near the end of the year we will make a decision, and then there will be a recommendation forthcoming.

Senator LEVIN. So within this fiscal year you will make a recommendation on whether or not we should continue to comply with SALT?

Dr. COOPER. No, not within this fiscal year.

Senator LEVIN. I thought you said at the end of the year.

Dr. COOPER. Well, this fiscal year being——

Senator LEVIN. Oh, I am sorry. The 1987 fiscal year.

Dr. COOPER. Yes. Right now we anticipate—well, let me put it another way. I anticipate that it will be no sooner than December.

Senator LEVIN. Of 1986.

Dr. COOPER. Of 1986. So it will actually be in the 1987 budget that we would go forward.

Senator LEVIN. And the funding which you have for these options in the 1987 budget is all at the research——

Dr. COOPER. It is the minimum amount, Senator, that we think would be necessary to go forward with any of these basing modes, and quite frankly, it is a funding wedge. We don't know which one of the basing modes, if any, it will be directed to. That depends on what the decision is.

Senator **Levin**. Will the Air Force be recommending in effect by the end of this year whether or not we should continue to comply with SALT II?

I mean, if these basing modes, some of them, violate SALT II, if you recommended one of those basing modes which violated SALT II, would you agree that you would then in effect be deciding at the end of the year whether to recommend to violate SALT II or not?

General **May**. Sir, I might mention that in a sense that recommendation has already been tabled in that the small missile itself, once we test that missile, we have violated SALT.

Senator **Levin**. Well, have you recommended that we test it?

General **May**. No, sir. We are following the directions of the Congress and the Department of Defense in preparing to go into full scale development on a small missile. Once we went into that and had a test of that article, we would violate the SALT II agreements.

Senator **Levin**. But my question is have you recommended, has the Air Force recommended to us whether we should violate SALT II by testing that new missile?

Dr. **Cooper**. Senator, I don't really think that is a call that the Air Force makes. We will——

Senator **Levin**. I am not saying that it is. I am just asking you whether you have made that recommendation. I'm not saying you should have.

Dr. **Cooper**. I understand. I am not aware that we have made that recommendation. I have never heard it discussed in the Air Force.

Senator **Levin**. In that sense?

Dr. **Cooper**. In that sense.

Senator **Levin**. OK.

Mr. Chairman, what I have been questioning about relates to the options for the new basing modes as to whether or not they comply with SALT II or not. The testimony is that the hardened silos clearly would violate the SALT II requirements.

Senator **Warner** [presiding]. That is an interesting point.

Senator **Levin**. And that the superhardened silos would clearly violate the SALT II requirement, and that the hardened Minuteman silo may very well violate the SALT II requirement.

Senator **Warner**. So there is a bit of a grey area between hard and hardened?

Senator **Levin**. No, the superhardened silos, so-called, both options, clearly violates SALT II. Those would be new silos, as I understand it.

General **May**. New silos, that is why they violate them, sir, not because of their hardness but because they are new silos.

Senator **Levin**. And the hardened Minuteman silo may very well violate SALT II because of the volume restriction in SALT II.

General **May**. That is correct, sir.

Senator **Warner**. For the record, SALT II is unratified.

Senator LEVIN. That's correct, and as I understand it, it has been the President's position to observe the SALT II limits, is that correct?

Dr. COOPER. That is my understanding.

Senator LEVIN. And in your opinion, has this policy served the Nation's security interests?

Dr. COOPER. Yes, I think it has served the Nation's security interests at this point.

Senator LEVIN. That is all the questions I have.

Thank you, all of you.

Senator WARNER. I want to state for the record the precise language the administration has been using on that SALT II. It is to continue to abide by the provisions. There may be some nuances in the language.

General Randolph, I would like to commend the Air Force for moving the Minuteman III penaids program into development. The committee attaches a high priority to our penaids programs and looks forward to continuing efforts to get these systems in the force.

I am going to come to one question—is there anything else that needs to be brought up?

Let me just get into a general colloquy with you on a point of great interest to me as we proceed to develop the program. I am confident, absent some major breakthroughs in the arms control area, that this Nation will eventually have a mobile ICBM system. And speaking only for this Senator at the moment, I am going to concentrate very heavily on that aspect of mobility which would enable the system to have flexibility, considerable flexibility, to interface with the public during its lifetime.

Do you follow me?

Dr. COOPER. Yes, sir. You mentioned that before, last year.

Senator WARNER. It may well be that the original concept of the system or, let's say, the initial concept of the system will be restricted to Government property, to various locations, perhaps colocated with the existing Minuteman system, partially colocated with that installation and elsewhere in the United States, but I am going to follow very carefully the ability of this transporter and such accompanying logistics as are necessary to interface completely with the highway system because if the Soviets were to someday pose a threat greater than we envision at the present time and there becomes a clear inbalance in our strategic capabilities, we might have to quickly achieve a measure of restoring that balance by means of all-terrain deployment of this system, and it would be my hope and expectation at that time that the American people would understand the necessity.

So just generally speaking, do you think that is an achievable option if my view prevails?

Dr. COOPER. I think it is, but let me ask General May to comment on that further, Mr. Chairman.

General MAY. Yes, sir, we think it certainly is, and all of the work that we have done today in attempting to come to grips with siting the small ICBM has resulted in essentially no controversy from the States that we have worked with. And as you know, we have come down from consideration of 4,200 DOD/DOE installations throughout the continental United States down to 24 that we are looking at today in order to accomplish a legislative EIS.

And under our basic operational concept, we would not expect that the missile systems would come in contact with the American public unless there were a major change or something that perhaps would require the positive control launch of our alert bomber force, an event that has never occurred in our history.

So we think today we have an understanding of how we can deal with the environmental concerns and the public concerns in our present design of the mobile missile system.

Dr. COOPER. Mr. Chairman, if I could just add, I share the belief of General May. I think the issue ultimately will come down to not a technical issue but the political issue, as so many of these have, political survivability of it, and that is where we will need your help.

Senator WARNER. Well, I am more optimistic. I think we might originally—let's say the initial conception of the system would be confined basically to Government property. I would not want us, say, to go to a 70,000-pound missile with an accompanying, as you said, geometrically larger mobile transporter which would then suddenly preclude that system from taking to the highways, and frankly, maybe a whole—I don't know what the element will be, a regiment or battalion——

Dr. COOPER. Convoy.

Senator WARNER [continuing]. And for instance, moving it to a whole new area of the United States.

Dr. COOPER. Yes, sir.

Senator WARNER. The other night I listened to a very distinguished group of persons in the strategic area who are well recognized. One man was trying to draw a comparison to this proposed 70,000-pound missile and transporter equaling one of the very large commercial aircraft that we now have, pointing out the immobility of that plane to be moved about in various places. He was just trying to draw some mental diagram of how this thing, if it grows up to that proportion, is just going to be relegated to a very few operational places.

Dr. COOPER. Yes, sir.

Senator WARNER. And that caused me some concern.

Dr. COOPER. I might just express the same degree of optimism. I think General May and his people have done an exquisite job in terms of drawing down on the number of sites that we are looking at. And as you well know, in the MX controversy, that blew up in our face. We now are down selected to, I think, what is it, Charlie, 24?

General MAY. Twenty-four.

Dr. COOPER. Twenty-four sites, and surprisingly enough, the biggest resistance so far has come from our own people, but we can take care of those concerns about impacting operations on Government land. But so far, so good. So I am optimistic as well.

Senator WARNER. All right.

Well, gentlemen, we have had a very good hearing today.

Mr. Levin, unless you have further questions——

Senator LEVIN. Just a few questions in an area that you and I have discussed, I believe, Mr. Chairman, and that is the question of

Soviet BMD, and I understand that General Randolph might be the right person to ask about the efforts that we are making to defeat a Soviet SDI or BMD.

Is that accurate?

Are you the right person to ask about that subject?

Dr. **Cooper**. We can all comment on that.

Senator **Levin**. Can you tell us whether we are making efforts to defeat a Soviet SDI system?

General **Randolph**. Well, of course, one of the efforts that we are doing right now, and I guess I have got to be careful, but we are looking very carefully at decoys, ways that would confuse such a system as the reentry vehicles penetrate, and in fact, we have a considerable effort, including testing, which takes a look at ways to accomplish that.

I would prefer, Senator, to provide you more detail for the record because I am a little bit concerned if I say much more than that I will get into a classified area.

[The information follows:]

SOVIET STRATEGIC SYSTEM

The effectiveness of countermeasures is an important element of an informed decision in the future about whether or not to begin development of selected SDI systems. For this reason, the SDI Organization's research into potential counters to U.S. SDI defenses is closely coordinated with Air Force research to enhance the penetration of traditional technology Soviet defenses by U.S. reentry vehicles. In fact, the Air Force System Command's Ballistic Missile Office is a participant in SDIO's effort to examine potential Soviet countermeasures. Advanced countermeasure technology must be pursued commensurate with SDI technology until we can determine how effective advanced defenses might be.

Air Force research into the penetration of Soviet defenses is carried out under the Advanced Strategic Missile Systems (ASMS) program of the Ballistic Missile Office. That research is presently focused primarily on providing options to counter near-term defenses that the Soviets are currently testing or deploying, defenses that are approximately equivalent to our 1970s Safeguard System.

It appears that penetration aids such as those being developed in the ASMS program in the near-term offer the most cost-effective solution to preserving the deterrent effectiveness of our offensive ballistic missile against Soviet defenses. The relative cost-effectiveness of countermeasures to advanced U.S. or Soviet SDI systems can only be addressed by continued SDIO and Air Force research.

If the U.S. concludes, following completion of the SDI research program, that an effective defense against ballistic missiles is feasible, this conclusion will be based in part on an evaluation of the feasibility of effective ballistic missile countermeasures.

Dr. **Cooper**. If I could add, though, Senator Levin, we are looking at areas to defeat Soviet ballistic missile defenses, but there is a push/pull effect here. We are also pursuing those technologies so that we understand in our own SDI program what the frailties might be, and I think there is a synergistic effect there that certainly we want to have that capability, if we need it, to go against Soviet defenses, but we would also like to understand the weaknesses in our own system so we can correct it.

So I think that is a very healthy thing for us to do.

Senator **Levin**. And who is in charge of that program?

General **Randolph**. That program comes under my jurisdiction also, yes, sir.

Senator **Levin**. How much money are we spending this year, 1986, in this area, to try to defeat a Soviet SDI?

General **May**. Sir, I think we are spending approximately $160 million in a program that we refer to as advanced strategic missile systems, and primarily we are involved with looking at different kinds of technologies that might stand us in good stead if the Soviets were to improve their present capabilities to defend against ballistic reentry vehicles. But the program itself is not designed per se to go against a Soviet SDI Program. It is the kind of developmental effort that puts us in a position to react to future threats.

Senator **Levin**. Would we view an SDI Program as a threat, a Soviet SDI Program as a threat?

General **May**. Well, it certainly is a reaction in interface between offensive capability and defensive capabilities, and the best knowledge——

Senator **Levin**. I don't understand that. Does that mean yes?

General **Randolph**. Let me address the question.

The answer is clearly yes, if there is an asymmetry. If we—I think the President has said if we both have a defensive system, then he views that as stabilizing. I certainly would agree with that position. But if the Soviets had it and we did not, that would be a very serious problem for us.

Senator **Levin**. So that if the Soviets proceeded to have an SDI system and we did not, we would view that as very threatening.

General **Randolph**. Yes, sir.

Senator **Levin**. Are you working with our SDI people?

General **Randolph**. Yes, sir. In fact, within the Air Force I am responsible for executing for General Abrahamson those pieces which he has assigned to the Air Force, which is about one-third of the program. So we handled those pieces within the Air Force.

Dr. **Cooper**. Senator, he funds it out of his budget, but it comes to the Air Force to execute.

Senator **Levin**. Would you supply for the record what specific programs we are implementing, research programs or development programs that we are implementing to defeat, evade, spoof, avoid, a Soviet ballistic missile defense?

Dr. **Cooper**. We will do that.

General **Randolph**. Yes, sir.

[The information follows:]

Soviet Ballistic Missile Defense

The Advanced Strategic Missile Systems (ASMS) program is developing and demonstrating technologies to counter Soviet ballistic missile defenses. These efforts are focused on providing options to counter defenses that the Soviets are currently testing or deploying. The ASMS penetration program's objective is to maintain the technolgoy base and advanced development necessary to preserve a readiness posture for options responsive to the projected threat.

ASMS is developing reentry vehicle (RV) decoys, advanced radar chaff, defense suppression concepts, and maneuvering reentry vehicle technologies that allow the RV to evade defensive interceptors.

In addition, in fiscal year 1987 the Air Force will begin Full Scale Engineering Development on a penetration aids system for Minuteman III to counter the upgraded, treaty-limited Moscow defenses. This penetration aid system will be operational in 1991.

Senator **Levin**. Your answer, I think, is very illuminating as to how we would perceive a Soviet SDI system if we didn't move in the same direction. I think it ought to make it a little easier for us to understand how they would view us moving in that direction as a threat to them unless they also did so.

I mean, it has got to be clear, I would think, to us that our moving is viewed by them the same way as their moving to a ballistic missile defense would be viewed by us, unless we also did the same thing.

Dr. Cooper. I would have to agree with that.

General Randolph. I would also say, though, Senator, that the President has said that he believes that the Soviets are moving in the direction of SDI.

Senator Levin. The President has not said that he thinks the Soviets would unilaterally deploy an SDI system in violation of the ABM system. All he has said is that they are doing research in this area, which they obviously are. But he has not said that they are prepared to deploy it.

But we have said that we might deploy it. That is a pretty critical difference. We ought to be able to understand that.

Now, we still may want to do it, but at least we ought to understand why it is that they react to our suggestion that we might deploy a system without their joining us in violation of the ABM Treaty. They are reacting exactly the same way we would react. We are reacting.

In fact, your testimony I think is clear in that regard. I have never heard the President speak as clearly as you just have on this point, that we would view their moving unilaterally without us as a threat to us. The President apparently doesn't seem to think that our moving unilaterally without them would be a threat to them. All he says is we would like to move mutually, we hope we can move mutually and so forth.

Dr. Cooper. But Senator, I think General Randolph is responding—and I am not meaning to speak for him—from the perspective of a military man, and I heard something that General Vessey said, Mr. Chairman. I think it was a year ago before your committee, that as a military man he cannot judge intentions, he can only judge capabilities, and obviously that is a concern. But I think from the President's perspective, he is not looking at SDI alone. He is looking at offensive arms, he is looking at defensive arms, and he is looking at arms control, and I think you have to take all of that into context.

And taking any one of those in isolation, yes, the SDI, Soviet SDI would be viewed as a threat, particularly if he got to the point where he could attack and then there would be no way he could respond, and he would have a shield, that is of concern from a military point of view.

Senator Levin. I would think it would be. I totally agree with you.

Thank you, Mr. Chairman.

Senator Warner. Thank you very much.

It has been pointed out by one of our staff members here that the small ICBM, any size, would violate SALT II as soon as it is tested. And I am going to ask Mr. Bott, there was another point you wanted to make here?

Mr. **Bott**. I think the point was clarified with respect to the existing penaids efforts, which are aimed at countering existing systems as opposed to space-based SDI systems.

Senator **Warner**. Is that sufficiently clarified?

Senator **Levin**. Are we also worried about a space-based system, a Soviet space-based system?

General **Randolph**. Any work that we have got right now is purely in a theoretical area. We don't have hardware and testing. So the answer is we are concerned about it, but there is not, as Mr. Bott has pointed out, there isn't any hardware and testing in that area.

Senator **Levin**. Are we also then trying to find vulnerabilities in our SDI system?

Do we have a red team to do that?

General **Randolph**. There is a red team that is part of the SDI operation right now.

Senator **Levin**. That is not part of your operation?

General **Randolph**. We are part of the red team. We provide support for the red team.

Senator **Levin**. Would you tell us for the record what the level of funding is for that red team? Are you able to break it out that way?

General **Randolph**. Yes, sir, we can tell you for the record.

[The information follows:]

Support for the Red Team

All SDI Red Team activities are budgeted for $8.9M in fiscal year 1986.

Senator **Warner**. Thank you very much, gentlemen. We have had an excellent day of hearing with both panels of witnesses, and I compliment the witnesses as well as the staff.

Dr. **Cooper**. Thank you, Mr. Chairman.

Might I request permission for the record to expand on a question you asked about what changes would be needed in the Price amendment?

Senator **Warner**. Yes.

Dr. **Cooper**. I think that deserves careful thought.

Senator **Warner**. I am glad you have asked for that, and permission is granted.

[The information follows:]

Price Amendment

There are two approaches to make changes in the Price amendment to support a more flexible program of development for the small ICBM. The optimum change would be to repeal the Price amendment completely and direct the Air Force to develop and deploy a small single RV ICBM capable of deployment in the mobile mode. Such a change will allow the Air Force the latitude to build the best small ICBM to fulfill the requirements of the Strategic Air Command.

A second approach is to change all parameters of the Price amendment which call for 30,000 lbs (desired) and 33,000 (maximum), to allow for 37,000 lbs (desired) with 40,000 lbs (as maximum allowable weight).

Dr. **Cooper**. I would like to thank you, Mr. Chairman, for the strong support you and your subcommittee have given to us. It is greatly appreciated.

Senator **Warner**. Thank you very much.

Senator LEVIN. Mr. Chairman, how long will the record be left open for our questions?

Senator WARNER. You and I can work that out to accommodate each other.

Senator LEVIN. Would a couple of days be OK, at least?

Senator WARNER. This record, as such, is the subcommittee's, and will be open until the subcommittee hearings are concluded.

[Questions for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN WARNER

DELAY IN SICBM PROGRAM

Senator WARNER. You indicated in your testimony that any major change to the program at the DSARC will perturb the schedule. What is your assessment of the length of such delay, and does the delay result from technical issues that must be resolved, or from acquisition policy requirements, such as competition, that must be satisfied, or from some combination of both?

Dr. HICKS. We are currently looking at ways to minimize the delay. The length of delay will be dependent on the systems components which might be changed. Our best estimate is a few months to two years delay in IOC. FOC may not be impacted if we go to multiple warhead systems since the deployed warhead rate would be faster once we start. The delay would be the time required to prepare procurement specifications and award new contracts.

AIRS GUIDANCE AND ALTERNATE GUIDANCE COMPETITION

Senator WARNER. What is the relationship between a second source for the AIRS guidance, for which about $55 million is requested in the MX line, and the alternate guidance competition that is funded in the small ICBM line?

General MAY. There is no relationship between the Peacekeeper second source effort and the alternate guidance competition for the small ICBM. The decision to qualify a Peacekeeper second source for the AIRS guidance was made independently from the alternate guidance competition for the Small ICBM. There are many reasons to consider a second source or component breakout for the Peacekeeper inertial measurement unit (IMU).

(1) It is a high cost critical component built in a sole source environment. Past experience indicates price reductions of 15 percent are possible with competition.

(2) Some of the hybrid miniature electronic components cost as much as $3000 each. There are 263 of these hybrids in the IMU now. These items are solely built by one contractor. The government could save money and broaden the industrial base on these components through a second source.

(3) Experience has shown that ICBM systems remain deployed significantly longer than their design service life. A second source protects the Peacekeeper service life over the long term.

(4) Sole sources have not always been responsive to Air Force needs. They frequently have cost overruns and get behind schedule on deliveries. Quality is not always good. There is little pressure to change without competition. Increased quality will increase reliability which will, in turn, increase the SAC alert rate.

(5) The design is under program office control and the Air Force team of experts is in place. In a few years, when the design has transitioned to depot control, the task of developing a second source will be vastly more complicated.

(6) A second source may be able to further optimize the design for performance and/or producibility.

FOLLOW-ON BASING RESEARCH

Senator WARNER. What is the specific nature of the activity that would be funded by the request for follow-on basing research in fiscal year 1987? When, and on what basis, would you narrow the number of options that would be considered for further development?

General MAY. Advanced Basing Technology is broken out as follows:

	Million
Deep basing	$20
Other modes:	
Conceptual design and component testing	130

	Million
Facility design and testing	15
Blast and shock testing	60
Concealment testing	65
Environmental siting	25
System engineering	74
Total	389

We plan to narrow to one (or two) option(s) in December 1986 based on survivability, cost and military utility.

NOT FUNDING FOLLOW-ON BASING RESEARCH

Senator **Warner**. What would be the effect of Congress not funding follow-on basing research in fiscal year 1987? What is the minimal program required to keep follow-on basing options open for future consideration?

General **Randolph**. The effect is to preclude entering into Full Scale Development on any alternate basing mode for Peacekeeper. The minimal program to keep follow-on options open is $200 M, of which $20 M is for deep basing and $180 M if for generic testing of advanced basing concepts.

FUTURE PAYLOAD OPTIONS

Senator **Warner**. Has the full range of future payloads options, including new ballistic reentry vehicles, maneuvering reentry vehicles and earth penetrating warheads, with their associated penetration aids, been considered in arriving at small missile weights in the 37,000 to 40,000 pound class?

General **Randolph**. Yes. In conducting the detailed analysis and investigation for the Mobile Small ICBM Concept Alternatives Report, provided to Congress on January 8, 1986, the Air Force evaluated the complete spectrum of advanced payloads. Various payloads (and payload combinations) were evaluated for the baseline 30,000 lb missile, a 37,000 lb alternative, and other higher weight missiles.

Although it is believed that the payload options have direct applicability to the 37,000-40,000 lb class missile, not all of them would be available for the designated 1992 Initial Operating Capability.

WEIGHT CONSTRAINT ON SMALL ICBM

Senator **Warner**. What is the Air Force recommendation with regard to changing the congressionally imposed weight constraint on the small ICBM? Is this consistent with your personal opinion?

Dr. **Cooper**. The current Air Force baseline for the small ICBM calls for a 30,000 lb, single warhead missile deployed on hardened mobile launchers on government reservations. The President's budget contains the necessary funds required to initiate full-scale development on this program in fiscal year 1987. There are obvious benefits to be gained from an increase of weight to provide range and payload flexibility, while allowing for maximum mobility. A small ICBM in the weight range of 37,000 lbs would provide such flexibility.

SMALL ICBM AND M-X FOLLOW-ON BASING

Senator **Warner**. Does the Air Force consider the small ICBM program and the MX follow-on basing efforts to be related? To what degree would decisions about MX follow-on basing affect the Air Force's preference for Small ICBM payload configurations?

Dr. **Cooper**. The Air Force believes that the recommendations of the President's Commission on Strategic Forces (Scowcroft Commission) remain as relevant today as they were in 1983. One hundred Peacekeeper missiles are still very necessary to immediately provide a modernized, more militarily capable ICBM force for the United States. In the future, a highly survivable single warhead ICBM which provides increased stability is a paramount goal. Each system has its own distinct and separate characteristics, which are very complementary in nature. Mitigation of any of the recommended force levels or configurations will have an impact on the overall program. Such impacts would have to be determined pending the final outcome of the implementation of the President's modernization program.

SMALL ICBM OPTIMUM DESIGN

Senator WARNER. Did the Air Force identify a 30,000 lb small ICBM as the optimum design for a small single warhead missile?

Dr. COOPER. The Air Force was directed in the fiscal year 1984 Authorization Act (Section 1231) to develop a small single RV ICBM with weight no more than 33,000 lbs; the Secretary of Defense is required to report to both Houses of Congress if the weight of the small ICBM is expected to exceed 33,000 lbs. The Air Force did not identify 30,000 lbs as the optimum design.

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

ICBM SURVIVABILITY AND COST

Senator THURMOND. Facing the threat of the 1990s, what is the number of survivable reentry vehicles for a force of 500 single warhead small mobile ICBMs?

Dr. HICKS. In keeping with the overlapping and synergistic capabilities of the elements of the strategic Triad, there is no specific and unique threat allocation against the small ICBM. If the Soviets choose to use [deleted] force (with projected 1990s warheads) we estimate [deleted] small ICBMs would survive. This would be a very high price for the Soviets to pay to destroy [deleted].

LIFE CYCLE COST OF 500 SICBM

Senator THURMOND. What would the life cycle cost be of that program?

Dr. HICKS. Life cycle costs would be $38 billion (FY 85 $) for acquisition (RDT&E, procurement and military construction) plus the operations and support cost of $1.1 billion per year after full deployment.

ICBM SURVIVABILITY AND COST

Senator THURMOND. Against the same threat, how many survivable warheads would you predict from the 100 MX missiles in superhardened silos?

Dr. HICKS. The Soviets can not use the same threat against superhard silos. Optimally spaced superhard silos prevent the Soviets from using large numbers of attacking warheads at the same time. The attack they are forced to use will, with today's weapons, take [deleted]. The Peacekeeper missile is being designed to fly out through the environments which enforce these attacker time lines. The number of survivors will, therefore, be a function of when the decision is made to launch. The number of survivors remains quite high through [deleted]. We feel the complexity of the required attack and Soviet uncertainty in the attack results are such that it is very unlikely that the attack would be attempted.

LIFECYCLE COST OF 100 MXS

Senator THURMOND. What would be the life cycle cost for that force?

Dr. HICKS. Life cycle cost would be $13 billion (FY 85 $) for acquisition (RDT&E, procurement and military construction) plus the operations and support cost of $.1 billion per year after full deployment.

SURVIVABILITY OF MX MISSILES

Senator THURMOND. What would be your predicted survivability for reentry vehicles for 100 MX missiles in closely spaced superhardened silos overlayed by a ballistic missile defense system?

Dr. HICKS. Using current threat projects, a terminal defense system would not be required to provide adequate surviving ICBM capability. However, in the case of future responsive threats, like highly accurate maneuvering reentry vehicles with earth penetrating weapons, a terminal defense may be required and its overlay effectiveness is yet to be determined.

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

SILO HARDNESS AND SURVIVABILITY

Senator LEVIN. In hardening our missile silos the relationship between total system hardness and silo hardness is not well understood. Is it not true that system hardness is what is necessary to ensure the survivability of the missile force? At what level of silo hardness, measured in psi, do other factors dominate in achieving system hardness? Please explain what these other factors are.

Dr. HICKS. It is true that the missile/silo system hardness is what is necessary to ensure survivability of an individual missile/silo under attack. The Air Force is making assessments of the hardness of the missile-silo system to damage from likely Soviet attack scenarios. These hardness assessments consider structural hardness of the silo, missile/silo system vulnerability to ground motion, radiation effects, cratering, debris, and air blast overpressure related damage mechanisms. Each damage mechanism has its own lethal radius depending upon geology, height or depth of burst, weapon yield, and type of nuclear device. Thus, air blast overpressures determine the strength of the silo and, together with ground shock effects, the missile shock isolation system. Cratering attacks can defeat the silo-missile system through excessive ground motions or by preventing missile egress. Finally, system hardness can be determined by source region Electro Magnetic Pulse or radiation effects. The current approaches for missile-silo system designs provide for a balanced design to protect the missile system against the various damage mechanisms. In favorable geologies balanced hardness designs can survive at near crater's edge where overpressures may exceed 100,000 psi.

If one considers both hard silos and hard mobile launchers (HMLs) as parts of a total ICBM basing system, then another demension of system hardness emerges. In order to threaten our ICBMs, the Soviets would have to threaten to barrage a large area containing HMLs, using much of their throwweight while simultaneously threatening to attack very hard silos with pinpoint accuracy and very high yield warheads. Thus a mix of systems that includes hard missile silos would greatly complicate Soviet strategic force planning and would enhance the survivability of our missile force.

SILO SURVIVABILITY

Senator LEVIN. Beyond a certain level of silo hardness, there is a diminishing return in increased survivability. In view of projected Soviet capabilities in the 1990s, project the point in psi at which increased hardness ceases to be a worthwhile investment.

Dr. HICKS. We have demonstrated the capability to build affordable hardened silos able to survive pressures from [deleted]. These hardness levels are more than adequate for Soviet weapons [deleted]. Silo hardnesses much [deleted] have diminishing utility because [deleted] begin to be the kill mechanism at these overpressures. However, [deleted] are required to assure that they could crater our silos. Even if such weapons were developed, attacks on silos hardened to this level would still impose substantial costs and uncertainties for the attacker.

ACCURACY AND YIELD REQUIRED TO DEFEAT SILO

Senator LEVIN. What combination of accuracy (CEP) and yields will be necessary to defeat silo hardness of 50,000 psi? Which Soviet missiles, present and projected, will be able to achieve a kill probability of better than 50 percent against a silo hardened to 50,000 psi?

Dr. HICKS. To defeat a 50,000 psi superhard silo with high confidence would require an accuracy of [deleted]. This combination of accuracy and yield is [deleted]. Soviet accuracies better than [deleted] will be required to achieve a [deleted] current Soviet missiles do not have this capability. If the Soviets achieve this accuracy capability and choose to develop higher yield weapons, they can achieve a [deleted]. This would require considerable investment, years of development and testing, and even then superhard silos would still provide enhanced survivability and a very high degree of attacker uncertainty.

CONTINUATION OF SALT II LIMITS

Senator LEVIN. Do you believe that it remains in the best interests of the United States to continue to abide by SALT II limits for the next year?

Dr. HICKS. The administration has under review the answer to this very important question. When the President has announced his decision, we will proceed to implement the decision.

ICBM PROGRAM

Senator LEVIN. What is a reasonable IOC for the blue or green laser research projects to develop real-time, secure communications with submarines underway and submerged?

Dr. Hicks. On 22 May 1985 the Honorable William H. Taft sent a classified report, jointly prepared by the Navy and DARPA, to Senator Stevens on this subject. In his forwarding letter Mr. Taft stated, "Technical progress has been quite encouraging, and the Navy has begun the planning and document preparation necessary to make a Milestone I decision in 1986 on whether to start a Major System Acquisition leading to an operating SLC system." The technology and engineering progress since then has continued to be as good or better than predicted. Unfortunately, planning, budgeting, and documentation progress in the Navy has fallen far short of the promised schedule for a number of internal and external reasons.

If these Navy POM hurdles could be overcome, and contingent upon the anticipated success of the DARPA "space-qualifiable" laser project due to end in April 1987, a decision could be made to start engineering development of a satellite system late in FY87. A careful, sensible satellite program would take about five years from decision to start until IOC. Even so, there would remain some risk that we might find during this development that the laser lifetime, and therefore the cost of a satellite system manufactured with the current technology might not be acceptable.

No other satellite-based laser system can currently be identified which could do the work of the blue Xenon-Chloride Lead Raman-shifted system. DARPA is working on solid state blue laser candidates but they are at least 4 years behind the baseline technology. Green laser and receiver technology cannot provide sufficient capability.

Senator Levin. Thank you all.

Senator Warner. The hearing is now adjourned.

[Whereupon, at 1:11 p.m., the subcommittee adjourned subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

THURSDAY, MARCH 26, 1986

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

STRATEGIC AIR COMMAND'S STRATEGIC FORCE ASSESSMENT

The subcommittee met, in executive session, pursuant to notice, at 2:11 p.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Goldwater, Thurmond, Wilson, Nunn, Exon, and Levin.

Also present: Senator Gore.

Staff present: James F. McGovern, staff director and chief counsel; Arnold L. Punaro, staff director for the minority; Robert G. Bell, Robert F. Bott, Douglas R. Graham, John J. Hamre, William E. Hoehn, Jr., George K. Johnson, Jr.; professional staff members; Colleen M. Getz and Russell C. Miller; research assistants; Karen A. Love; staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Romie L. Brownlee, assistant to Senator Warner; James M. Bodner, assistant to Senator Cohen; Mark J. Albrecht, assistant to Senator Wilson; Allan W. Cameron, assistant to Senator Denton; Janne E. Nolan, assistant to Senator Hart; Jeffrey B. Subko, assistant to Senator Exon; John B. Keeley, assistant to Senator Levin; Thomas K. Longstreth, assistant to Senator Kennedy; and Milton D. Beach, assistant to Senator Glenn.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator **WARNER**. I am advised that my distinguished colleague Senator Hart will be delayed, but he has suggested that we proceed, and I would like to do so.

The subcommittee meets in closed session to receive an assessment of our strategic force posture. This is the third in a series of hearings on the fiscal year 1987 budget for national defense oriented toward broad oversight rather than program detail.

This afternoon, we have an opportunity to hear about the output side of our strategic modernization programs. The Chair looks to this testimony to provide an updated assessment of the present state of the strategic balance given existing targeting policy requirements and the threat, and an assessment of the future balance. Related to this assessment are such issues as the strengths and weaknesses of the U.S. force posture, including command, control, communications and intelligence, and asymmetries between United States and Soviet strategic force requirements.

Today's hearing will also provide an opportunity to address, from the standpoint of the operational commander, issues related to both the ICBM and bomber modernization programs.

Our witness this afternoon is Gen. Larry D. Welch, Commander in Chief of the Strategic Air Command. General Welch has had a distinguished career in the Air Force, including combat missions over North and South Vietnam and Laos. Today is General Welch's first appearance before the subcommittee, and I extend to him a very warm welcome.

I note the presence of our distinguished Chairman, Mr. Goldwater.

Before I turn to Mr. Goldwater and my other colleagues, I wish to acknowledge that tomorrow marks the 40th anniversary of the Strategic Air Command.

Mr. Chairman?

Chairman GOLDWATER. Yes, and they've accomplished a lot in a short time.

Senator WARNER. And we connect to the events last year that marked 40 years of peace in Europe. Today the men and women who have served in the Strategic Air Command over the years, and the men and women who serve today, have made a direct contribution to the deterrence of war, both conventional and nuclear. Peace has been and remains their profession. I am thankful that there have been and remain such dedicated professionals in the cause of peace.

The Chair has suggested we proceed to hear the testimony of our witnesses, after which we will have a 5 minute round of questions for as many rounds as the Chair believes is required.

I now turn to our distinguished chairman.

Chairman GOLDWATER. I have nothing to say other than to welcome Larry here. He is one of our great commanders, and we are very proud of him.

Senator WARNER. Mr. Wilson?

Senator WILSON. Thank you, Mr. Chairman. I look forward to listening to General Welch and will have some questions later, and won't delay the meeting.

Thank you.

Senator WARNER. Mr. Chairman, at the invitation of myself and other members of the committee, we have Mr. Gore who has joined us. I will insert Senator Glenn's opening statement for the record.

[The opening statement of Senator John Glenn follows:]

OPENING STATEMENT BY SENATOR JOHN GLENN

I join my colleagues in welcoming you here today, General Welch. As you know, I have been a strong supporter of modernizing our strategic forces. Although I strongly support the small ICBM rather than the MX to complete the land based ICBM upgrade, I have been an ardent supporter of both the B-1B and ATB Bomber Modernization Program.

I have flown the B-1 and for the last two years I have visited the ATB production facilities.

My major concerns today are that we have not received the bomber study this committee requested last year and that the projected program costs of the ATB have not been released for general scrutiny.

Given the fiscal realities we face, we urgently need that information if we are to act in a responsible way.

I am hopeful that you, General Welch, can provide us some helpful information today and I look forward to your testimony.

Thank you, Mr. Chairman.

Senator **Warner**. General, if you would proceed.

STATEMENT OF GEN. LARRY D. WELCH, U.S. AIR FORCE, COMMANDER IN CHIEF, STRATEGIC AIR COMMAND AND DIRECTOR, STRATEGIC TARGET PLANNING

General **Welch**. Thank you, Mr. Chairman.

On behalf of the 116,000 men and women of the Strategic Air Command, I thank you for the comments about the 40th anniversary, and I also welcome this opportunity to discuss some important strategic issues of mutual interest with your subcommittee.

With your permission, I will simply submit my statement for the record, and then as requested by the committee, I have a short presentation which addresses the nuclear strategy and our current and future capabilities to carry this out.

STATUS OF STRATEGIC NUCLEAR CAPABILITIES

As you would expect, I have a few viewgraphs to help us focus on those issues. I would like to begin with just a short framework of the objectives and strategies that drives the nuclear requirements, and then I will look at those nuclear requirements and the specific force requirements to satisfy the strategy.

NATIONAL SECURITY OBJECTIVES

[Deleted].

Before I talk specifically about the kind of capabilities that we need to carry out those objectives, I think it is useful to focus for just a minute on some key Soviet forces capabilities, and particularly some trends that drive us in stating those requirements. I know this committee needs no threat briefing. I certainly am not going to embark on one. I just want to spend one slide talking about some of the trends that concern us the most.

Changing Nature of Soviet Forces

Capabilities: Growing number of prompt, accurate offensive systems; steadily increasing hardness of nuclear forces, command control, and leadership facilities; increasing emphasis on redundancy, dispersion, and mobility of forces and command control assets; and continuing modernization and expansion of an extensive strategic defensive system.

End result: Forces more suited to warwinning strategy than assured destruction strategy.

The first trend in the Soviet forces, enhanced accuracy and enhanced throwweight, has enabled them to field a counterforce capability that gives them a considerable advantage in prompt hard target capability over U.S. forces. I regard that advantage as being at the root of the current strategic imbalance, and our most urgent requirement is to correct that particular and specific imbalance, and I think it is the most destabilizing element of the existing situation.

A second trend also related to those forces is hardening their nuclear forces, command and control, and leadership facilities so as to make those forces much less vulnerable to U.S. counterattack or U.S. retaliatory response.

Along that same line, we see the Soviets devoting greater resources to dispersion and concealment, and the mobility of both their nuclear forces and command assets, again to enhance their capability to survive, for those forces to survive a U.S. retaliatory response. At the same time they continue to expand and improve what is already the most extensive strategic defense system on the face of the earth, and the end result of those four trends which we find obviously very worrisome as they are over the years, in a steady grinding effort, producing the kind of forces that we would see as being suited to a war-winning strategy rather than the so-called assured destruction strategy or a deterrent strategy.

Now, having said that, let me turn now to the adjustments or the evolution of the U.S. nuclear strategy to deal both with those objectives I just showed you and also to deal with these trends.

U.S. NUCLEAR STRATEGY

Strategy: [Deleted.]
Targets: [Deleted.]
Nuclear force requirements: [Deleted.]

[Deleted.]

Here are the characteristics required in those forces. They are somewhat different than the characteristics required in the assured destruction strategy, but certainly are required with counterforce.

The first requirement which I have already mentioned clearly must be prompt, accurate weapons capable of effective attacks, holding at risk this particular set of targets. We increasingly see relocatable targets, and one of our greater challenges will be [deleted] holding the relocatable targets at risk. We have to penetrate increasingly improved defenses, and our counterforce strategy calls for minimum damage to other than counterforce targets. So again, we need accurate, prompt weapons, and the weapons that will give us the advantage.

So those are the kinds of forces we are pursuing, that is, the forces that would achieve those objectives against those targets with these kinds of characteristics.

I will turn to those forces now. Let me say that the first step in doing that is, and I think should be to maximize the effectiveness of what we have already fielded, and I would like to first touch on that. Clearly, the forces we bought in the 1960's were not designed for that particular task, but we find that a good many of them have the flexibility and the growth potential to adjust to that task, and with the support of this committee we have done a great deal to do just exactly that.

UPGRADE THE CAPABILITY OF EXISTING FORCES

Minuteman accuracy and reliability/maintainability.
B-52 cruise missile, navigation, bombing accuracy, and defensive systems.

FB-111 reliability/maintainability.
Command and control upgrades.
KC-135 re-engining.

Minuteman accuracy has been improved by a factor of about 35 percent, and I will show you the result of that in a minute. We have invested about $3 billion in upgrading the B-52 to give it effectiveness against that class of targets, and to extend its useful life, and I will show you the result of that in a minute. The FB-111 reliability and maintainability, about $1 billion worth of improvements went into that system. Lots of work in updating existing command and control systems, which is already underway, as well as fielding new systems; and the KC-135 re-engining program to expand the air refueling capability that we need to accommodate this great increase in fuel required for the cruise missile carriers.

So that is a very cost effective package, and we have good results. Let me show you a couple of the results of that effort.

USE EXISTING FORCES MORE EFFECTIVELY

Increase readiness: Spare parts and support equipment; more efficient support organization; and more realistic training environment.

Also, a lot of effort again with the support of this committee to leverage what we have on the ramp with the right kind of support; increased readiness from better spare parts and equipment support. We have done everything we can internally to more efficiently produce sorties and readiness, and we have made great strides in providing our air crews with a more realistic training environment to be sure that both man and machine are as ready as circumstances will permit, and I will show you the end result of some of those readiness efforts.

B-52G UPGRADES

$1.5B investment (1960-86)-99% completed [deleted].
Improved delivery accuracy by factor of almost 3 [deleted].

Looking specifically at the B-52 as one example of the benefits from fixing up what we have on the ramp now, you have approved and we have invested $1.5 billion in the B-52G fleet. That is the older set of B-52's. They are the SIOP committed B-52's. What we have gotten for that was more than double the number of weapons we can deliver on Soviet targets, and we have improved the accuracy of every one of those weapons by a factor of almost three, and you see the result of that on the left side.

And what I show you is what would have happened to the capability of those B-52G's had we not made that investment on this line. And you can see by this point in time those B-52's would be deteriorating to the point of virtually zero capability in a couple of years. Instead, with that investment we have doubled the capability over the timeframe while we are fielding the B-1, and by the time the B-1 reaches FOC, that capability will begin to drop off because they will no longer be able to penetrate. But even so, we retain about the level that we had when we started this program 10 years ago.

My point is that we have extended the life of the B-52G for that period of time with those investments, and we have provided a significant increase at the time we needed it most, which is while we are fielding the B-1.

The dropoff you see here will not actually occur in the bomber force, because by this point the B-1 is fully on line, fully mission capable, and it will increase the capability of the bombers even further. Therefore, it was a wise investment that worked out well.

On the readiness side, for a number of years the B-52G rocked along at about a 40-percent mission capable readiness, on average, around the clock, day after day, week after week.

With the initiatives I discussed and the investment of spare parts, we now sit at 70 percent average daily mission capable rate for the entire B-52 fleet, B-52G and B-52H, which of course is a happy story from my viewpoint as the operational commander.

MINUTEMAN III UPGRADES

$2.4B investment (1979-91).
Sustained high alert rate.
Delivery accuracy improved by 34%.
[Deleted.]

Looking at the missile improvements over the 7-year period, the 8-year period, we have invested about $1.8 billion, and we have this investment, so it will be a total of $2.4 billion over that time period. We have increased delivery about 35 percent, and that multiplies the effectiveness of that warhead. As you can see down here with that investment, the Minuteman III would have a [deleted] against the SS-18 hardened silo. Today it has a [deleted]. A good part of that investment was in reliability and maintainability so we could sustain the statistically high alert rate.

You can see from this chart that there has been an improvement over 98 percent. That is a key point because that is a key characteristic of ICBM's, that is, the high peacetime alert rate. We can't get that out of any other leg of the triad. In fact, today on a day to day basis, the Minuteman force provides us [deleted] percent of the peacetime alert warheads for 12 percent of the cost of the strategic force. That is an extremely important part of our peacetime capability, and there is no other way to get that kind of capability for that price.

GAINS FROM UPGRADES

CAPABILITY AGAINST SOVIET NUCLEAR FORCES

[Deleted.]

Now, here is what we have gotten overall against this very important class of targets, that is, Soviet nuclear forces, our No. 1 priority target class. Here is what we have gained over the years and where we stand. The top line is total capability, that is, prompt kill capability follow up [deleted] later by the bombers, and by 1986, if you count the whole bar, [deleted] and let me describe the damage criteria line. That is simply a measure of the number of targets we need to be able to hold at risk to have high confidenced deterrence.

[Deleted.] So we have gone from here to here in prompt capability against that requirement, and we have gone from here to here in total capability which can be applied to that requirement but does not give you the prompt capability that you need. But it gives you an overall view of where we have been and where we need to go.

The only way to close that gap, of course, in the near term is by deploying the full complement of Peacekeeper missiles, and let me show you why I say that.

THE CURRENT TASK CAPABILITY IMBALANCE

[Deleted.]

Well, first let me look at the overall imbalance. What I just showed was the capability against a single class of targets, that is, Soviet nuclear forces. Now let me give you the overall picture before I talk about any more specifies.

Senator **WARNER**. Excuse me. This preceding chart was limited to just counterforce strategic forces?

General **WELCH**. Yes. The preceding chart was against only one of the four classes of strategic targets, and that is Soviet strategic nuclear forces.

[Deleted.] This is the total stack-up of targets of some [deleted] in this stack, and this represents our total capability against that stack of targets.

[Deleted.]

Senator **NUNN**. Mr. Chairman, may I ask a question on this assumption here?

Senator **WARNER**. We have been conducting these subcommittee hearings on an informal basis, so please go ahead.

[Deleted.]

I think the number that goes in there for ICBM's is we have lost [deleted] of them.

Senator **WARNER**. Now, wouldn't that attack on an ICBM field, a Minuteman III, come almost simultaneously with the first wave of attack? I mean, you have an impact, and it would just be all right together?

General **WELCH**. It is very difficult for the Soviets to plan an attack that gives them simultaneous impacts everywhere they would like to be.

Senator **WARNER**. I am just talking the Minuteman fields.

General **WELCH**. Given we wait for the first impact on a Minuteman field, the [deleted] laydown that we would expect against the Minuteman field, the entire laydown is over about [deleted].

Senator **WARNER**. Now, how many minutes is absorbed in the first phase of that [deleted] laydown?

General **WELCH**. Well, they come virtually simultaneously.

Senator **WARNER**. That is my point. So the first phase of that is simultaneous.

Now, given that, now, let's go back to your bar.

Is the bar after that first phase?

General **WELCH**. No, sir, it is not. The bar assumes only minimum losses of the Minuteman ICBM, if we were to ride out that [deleted] phase you just described.

Senator **WARNER**. I split the [deleted] phase. You said that took [deleted]. I was dividing that into the first phase which you said comes simultaneously. Then there is an interval of time, and then the second phase comes.

General **Welch**. I am sorry, I have confused the issue. The [deleted] attack is virtually simultaneous. The way we would expect the attack to come is the Soviets would lay down, when they decided to attack the Minuteman fields, they would lay down a [deleted] barrage virtually simultaneously, that is, [deleted] on each silo.

Senator **Warner**. Now, given that, is that first [deleted] in that bar?

General **Welch**. No, that is not.

Senator **Exon**. Do I understand, is another way to state the chart that is up there now is if the Soviets and we launch simultaneously? Is that the way of bringing that chart, that is before anybody has sustained any damage?

General **Welch**. That's correct. This is the best that either side can do, that is, this is the best we can ever expect, and if we have launched promptly before we have sustained any appreciable damage.

Now, I didn't make any prediction about whether or not we would do that. This is simply the best that we could expect.

Senator **Warner**. But I presume that when you say we are launching [deleted] that that detonation is a cruise missile or some other type other than on the Minuteman?

General **Welch**. Probably on a [deleted] maybe on [deleted] but certainly the [deleted] it takes longer to hit them than it does the [deleted].

Senator **Warner**. And you think under all scenarios that they would not hit the [deleted] but some other targets?

General **Welch**. [Deleted.] I think that would be extremely difficult to do, but it is a scenario that they might try.

But the most practical attack would be [deleted].

Senator **Levin**. Could you tell us what you are measuring in the capability column? Is that warheads or megatonnge or what?

General **Welch**. That is capability to attack those targets.

Senator **Levin**. Is that warheads you are measuring?

General **Welch**. Let me give you the numbers. Perhaps that will help.

There are about [deleted] targets in this column. There are about [deleted] warheads in this column. However, those warheads [deleted] have a damage expectancy of [deleted] against a great many of those targets. So if you apply these [deleted] or so warheads to this [deleted] or so targets, you do about [deleted] the damage that you require against that target set.

Looking at the Soviet side, if the Soviets target to the same objectives that I have just described to you, then they have to deal with about [deleted] targets. Our target base is much softer and much smaller. They also have some [deleted] warheads to deal with those [deleted] targets. Our targets are softer. So the Soviets have [deleted] the capability to deal with U.S. targets, and we have [deleted] the capability to deal with Soviet targets.

Now, the reason I put the chart up is because of the parity question which constantly comes up. We do indeed have approximate parity in warheads. We do not have approximate parity in the targets that we have to address. So this gives you the overall capability.

Now, the solution to this obviously is not to buy [deleted] as many warheads, and no one is going to recommend that to you. The solution to this is a strategic modernization program which provides you a set of warheads that are capable of dealing with those hard targets.

I think the next chart will illustrate what we get from the new and modern warheads.

ADDRESSING CAPABILITY SHORTFALLS

Prompt hard target capability is greatest shortfall.
Need full Peacekeeper deployment now.
[Deleted.]

What I have shown you is prompt, hard target capability against, again, the SS-18 hardened silo. We use it for our benchmark because it is the Soviets' prompt hard target kill capability, and it is our most worrisome target.

But what you see is the probability of damage generated by the three systems available to us this year against that target, and of course, the Peacekeeper goes against that target [deleted] the Minuteman takes [deleted] to attack that target. The two future systems will be very helpful; the Trident D-5 for the first time gives us a sea-launched ballistic missile that has very considerable capability against those hard targets; and the small ICBM is nearly as good as the Peacekeeper.

The problem, of course, or not the problem but the difference, or the challenge is that the cost per alert warhead is considerably higher for those two systems. While we strongly support those two systems, they will not substitute for Peacekeeper unless we have unlimited funds to spend on warheads.

Let me turn now to putting the various ICBM and SLBM programs in context the way we see them as the operational command.

PROMPT HARD TARGET RESPONSE

[A PHASED APPROACH TO CORRECTING THE IMBALANCE]

50 Peacekeeper in upgraded Minuteman silos.
Near-term capability against hardened ICBM's.
High alert rates [deleted] for lowest cost; assured connectivity.
More [deleted] capability against hard silos.
Follow-on Peacekeeper in deceptive/mobile/hardened mode.
Increased survivability and more flexible response options.
Fiscal year 1988 issue.
Trident II (D-5) submarines.
Adds enduring hard-target capability.
SICBM in mobile mode.
Endurability with high alert rate and assured connectivity.

The first 50 Peacekeepers in the upgraded Minuteman silos which this committee has approved gives us by far the fastest, lowest cost leg up to address that deficiency in prompt, hard target kill that I have already discussed. In fact, it [deleted] the overall U.S. strategic forces capability against those hard silos. The drawback is well known by this committee. That is, if deterrence fails and the Soviets attack in spite of the capability, then they may not have long-term survivability.

We move to the second fifty Peacekeepers, if we put those in increased survivability modes which we intend to do, and we plan to submit to the committee our proposal in fiscal year 1988, then we get increased survivability and more flexible response options than we do with this mode, and at the same time we continue to field a very high alert rate and relatively low cost. The cost will be some increased cost for the more survivable mode, but we think it will work.

The next system behind the follow-on Peacekeeper is the Trident D-5 submarine. [Deleted.] We are highly supportive of that. It will of course be at considerably increased cost per alert warhead.

And then finally, the small ICBM combines a number of the more desirable attributes of the fixed ICBM. That is, we can maintain a high alert rate, and we have assured connectivity, and it also gives us a great deal of endurability. The drawback is that it is the highest cost of all the warheads that I have put on the chart. So it is no surprise to you that as we proceed from the top of this chart to the bottom of this chart we get increased endurability, we get increased workable options, and we increase the cost per warhead.

And I guess that is just a fancy way of saying there is no free lunch. We do regard that obviously as the right phased approach to buying the correct number of warheads that we need for high confidence deterrence.

Senator NUNN. General, do you have a chart that shows the comparable boxes that you showed on the previous chart after you have done all this?

General WELCH. Yes, sir, it is coming up.

Senator NUNN. All right.

ADDRESSING CAPABILITY SHORTFALLS

[BOMBERS—NOW]

[Deleted.]

General WELCH. I had better touch on the bomber before I get to there because the bomber is part of that total that you are seeing on the boxes.

The right bomber clearly is the B-1. It is with us now. It is coming on line now. It has the ability to penetrate for some years to come. [Deleted.]

I knew someone was going to ask me where is the ATB on that chart? I would say it is on the chart; you just can't see it.

ADDRESSING CAPABILITY SHORTFALLS

ADVANCED TECHNOLOGY BOMBER

[Deleted.]

So let me turn to the ATB. Where I said the B-1 is the right bomber now, clearly the ATB is the right bomber for the penetrating bomber well into the 21st century. It has good range, it carries a good bomb load. [Deleted.] In short, it can do everything that the current bombers can do, and it has that added dimension, and it is a viable added dimension, that it has Stealth, and that Stealth gives it a dimension that no other bomber has.

[Deleted] the ATB will give Soviet defenses fits, and they will spend money there that they could otherwise spend on offenses.

Now, let me get to the chart you asked about, Senator Nunn.

CAPABILITY AGAINST SOVIET THREAT

[Deleted.]

I will first show you today on the left and 1991 on the right. And I chose 1991 because of the 5-year plan, obviously.

Here is the capability I showed you previously, hard target capability versus the requirement, and overall capability versus the requirement. Those are previous charts. If we proceed with the President's modernization program through 1991, which is 1000 Peacekeeper warheads and the Trident D-5 submarines, and the B-1 bomber, which is what we would have in our hands through 1991, then it is no surprise, with all the emphasis in those weapons systems I have just described on prompt hard target kill capability that we have largely addressed that part of the problem. We have also made great gains against all classes of targets, against the 1991 threat, and what we have not covered are [deleted] and some other lower priority targets [deleted].

Beyond that, the addition of the small ICBM and the ATB will not only fill part of the remaining gap but will address the emerging threat since as we continue to progress, the threat doesn't stop either.

Senator NUNN. We still are behind the Soviets, if you put the same charts up there exactly, because they are exceeding the line and we are below the line, is that right?

General WELCH. Today the Soviets can reach that line.

Senator NUNN. They will still be able to when this happens, right? So we will be behind the Soviets. But the gap will have narrowed.

Is that what the message is?

General WELCH. That's correct.

Senator NUNN. Does it bother you to be below the line even after we finish the modernization?

General WELCH. No, it does not. I would certainly like to be to that line. If we were at that line we would have a high confidence deterrent; then we could all rest easier.

On the other hand, if you make that kind of progress and with the promise of the small ICBM and the ATB following on to further improve that, I think there is no doubt that we have the deterrent power required to keep the Soviets from attacking in the first instance speculating about what happens when an actual attack takes place is an academic excercise because they won't attack.

I hesitated before I answered your question, and let me tell you why. The Soviets can get all the way to that line with current forces, and they can get all the way to that line against certain classes of targets in 1991. But we will always have a residual, even if they make the damage criteria against most classes of targets, with the Trident D-5 and the bombers, and the Peacekeeper in a more survivable mode, we will always have a residual surviving force that could extract great damage from the Soviets.

Senator NUNN. But neither one of these charts shows survivability. That is not part of the charts.

General WELCH. That is not part of the chart.

Senator WARNER. Now, 1991 assumes 50 more MX, making a total of 1,000? It does not contain the [deleted].

General WELCH. It contains, I believe, [deleted].

Senator WARNER. But that is a relatively small number.

General WELCH. That is what is on board at that time, [deleted].

Senator LEVIN. Does it have any of the European based weapons in it?

General WELCH. No, sir.

Senator LEVIN. None of the Pershing or cruise?

General WELCH. No, sir. These are U.S. weapons against Soviet targets.

If I stacked up NATO weapons against Warsaw Pact targets, then it gets somewhat worse.

Senator NUNN. This chart wouldn't really take into account many Tridents. We will have really very few of them out there then, and then we will have almost no Midgetman out there, [deleted].

I guess the message from it is that the modernization program will move us toward the solution that we need. It is still a good modernization program.

COMMAND AND CONTROL CONNECTIVITY

Upgrades: Groundwave emergency network; aircraft alerting communications EMP; very low frequency upgrades; super high frequency; miniature receive terminals; and Milstar.

General WELCH. Let me talk just a minute about command and control. By command and control I am simply referring to all the communications and all the command and control capability that is required to ensure that we can get direction from the National Command Authority, be they on the ground or in the air, and the nuclear CINC's, be they on the ground or in the air, or mobile on the ground, to the cockpits of the bombers, to the launch control facilities and to the missile submarine control rooms.

We currently have these six principal programs under way to do that, and we have now reached the point where we are fielding the first four.

[Deleted.]

So my message here is that we have the right programs, they have been well supported by this committee, and we are confident that we are moving rapidly toward the robust command and control that is as survivable as the forces it supports.

So although this has cost us a lot of money and taken a lot of support, it is a good news story.

Let me just close my presentation and then respond to your further questions.

PEOPLE

Professional, well trained, highly motivated people.
The most essential ingredient of deterrence.
Visible sign of our commitment.
Vital to retain quality people.
Professional living and working environment.
Competitive compensation package.

Chairman GOLDWATER. General, how are you getting along on the very low frequencies for submarine?

Are we building more antennas now than we were for low frequency?

General WELCH. [Deleted.] I should let a Navy man answer that question, I suppose. Let me tell you what I know about it. [Deleted.]

Just a month ago I was under the water in a Trident submarine to see what that was like. [Deleted.] So we are making progress.

Chairman GOLDWATER. Thank you.

General WELCH. I cannot close the briefing without talking about people because clearly we have highly motivated people, our most essential ingredient. We need your support for all those programs that attract and recruit and train and retain the military.

THE STATE OF DETERRENCE

Current situation:

Dedicated well-trained people leveraging existing capabilities.

Readiness initiatives increasing effectiveness of existing forces.

Upgrades to existing systems to support the nuclear strategy.

Trend—Continuing growth in Soviet capability.

Future prospects: U.S. strategic modernization program well conceived to underwrite the nuclear strategy in the face of Soviet advances.

Challenge: To maintain the momentum of U.S. strategic modernization.

Well, let me close with an overall summary. My current assessment is that our people are getting the best out of existing capabilities. Our readiness initiatives are helping. We have upgraded existing systems to about the level of their capability of improvement. The Soviets continue to grow, as I showed you. I think we do have that deterrent power today, and if we continue the strategic modernization program, there is no doubt in my mind that the deterrent is going to improve, for the reasons I showed you on the chart. And of course, my No. 1 concern is to maintain the momentum.

So that concludes the initial presentation, and I would be glad to respond to your questions.

[The prepared statement of General Welch follows:]

PREPARED STATEMENT OF GEN. LARRY D. WELCH, COMMANDER IN CHIEF, STRATEGIC AIR COMMAND AND DIRECTOR, STRATEGIC TARGET PLANNING

Mr. Chairman and members of the committee: I welcome this opportunity to appear before you today to discuss important strategic issues of mutual interest. As Commander in Chief of the Strategic Air Command, I am responsible for the day-to-day readiness of the bomber and ICBM legs of the strategic nuclear TRIAD. As the Director of Strategic Target Planning, I am also charged with building the integrated operations plan for employment of all three legs of the TRIAD. It is from this perspective that I offer an assessment of military capabilities to support the strategy of deterrence.

For over 40 years, deterrence based on credible nuclear forces has been the cornerstone of our national security posture. Soviet military power remains the principal threat to this nation's security and it is the Soviets we must deter. Thus, the overriding national security objective is to deter nuclear conflict by ensuring no Soviet leader could expect to gain from attacking the U.S. or our allies. Should deterrence fail, we are to counter the ongoing attack with an appropriate response to limit damage to the U.S. and our allies, and force termination of hostilities on terms that best protect U.S. interests.

The U.S. nuclear strategy of deterrence has necessarily evolved in response to a changing strategic balance and a better understanding of Soviet war aims and force objectives. During the sixties and much of the seventies, maintaining the capability to inflict massive damage on relatively vulnerable forces and economic structure was thought by the US and, presumably, the Soviets to be sufficient to ensure deterrence. Weapons of limited accuracy, effective against relatively soft military and economic targets, were deemed adequate to implement that strategy of assured destruction. While there was an increasing understanding through the seventies of the need for flexible US forces to include counterforce capability, there was not a corresponding commitment to acquisition of those capabilities to a sufficient degree . . . especially in light of Soviet efforts to erode our counterforce capabilities by silo hardening.

Beginning in the early seventies, it became apparent that the Soviets were developing forces to support a substantially more ominous set of objectives. They aggressively expanded and modernized their strategic offensive and defensive capabilities far beyond that necessary to support a strategy of assured destruction. The Soviets were and are fielding forces more appropriate to a counterforce first-strike capability.

In a few short years, the Soviets improved their nuclear capabilities relative to those of the US from a position of inferiority to one of essential equivalence, and finally to the point where they have achieved a substantial advantage in counterforce capability and force survivability. Advances in accuracy and throw weight give the large Soviet ICBM force a significant edge over US forces in the prompt capability to attack hardened targets. This advantage is at the core of the current strategic force imbalance. Moreover, a massive program to harden Soviet nuclear forces, command and control, and leadership facilities greatly improve their survivability against a US retaliatory response. Continuing improvements to active defenses included a proliferation of Soviet radars, control centers, surface-to-air missile sites and manned interceptors to counter US bombers.

Confronted with this evolution of Soviet capabilities and objectives, the US formulated a more effective, realistic and clearly stated strategy of flexible response to ensure deterrence by denying the Soviets any reasonable expectation of achieving their war aims. Of more importance, with support of the US Congress, we embarked on acquisition programs to underwrite that strategy.

Our task is to provide and operate the forces necessary to assure both the fact and the Soviet perception that we have the capability to deny their objectives. This strategy requires nuclear forces capable of retaliating against those assets most essential to Soviet objectives—their offensive nuclear forces, hardened command control structures, other military capabilities, and their war-supporting industries. The evolving Soviet target structure calls for US weapons with greatly improved accuracy and ability to penetrate advanced defenses and strike hardened targets while minimizing collateral damage.

We are fortunate that a significant portion of the TRIAD acquired in the sixties and seventies had the growth potential and flexibility to contribute to this strategy. Upgrades to the existing missile and bomber forces leveraged the already significant investment in these assets and provided increased capability to support our strategy of deterrence. For example, the $1.5 billion spent on B-52G upgrades over the past five years has more than doubled the near-term capability of this bomber and extended its useful life into the nineties. Specifically, these upgrades include modernizing B-52 offensive and defensive systems and deploying the air-launched cruise missile with the bomber. We are currently deploying the cruise missile on the B-52H. Similarly, the investments in MINUTEMAN III accuracy and reliability improvements have significantly increased this missile's capability against hardened Soviet targets.

Additionally, several readiness programs to enhance the capabilities of our existing bomber and missile forces are paying off. We have greatly leveraged the existing bomber force through increased spare parts support, enhanced maintenance and supply productivity, and decentralized support organizations. These innovations have brought B-52 readiness to an all-time high by increasing the fully mission capable rates for an average 40 percent in the early eighties to over 65 percent today. Our bomber aircrews are flying more realistic and comprehensive training sorties and participating in a wider variety of exercises to refine their combat skills.

These initiatives contribute to aircrew combat readiness. To continue to provide the most deterrence for the dollar, it is imperative that we provide the needed flying hours in all SAC aircraft to produce well-trained aircrews. We have also capitalized on our investment in the existing ICBM force through reliability and maintainability upgrades that will extend the life of the Minuteman weapon system to at least the year 2000 and provide continued high alert rates. Minuteman alert rates have historically averaged over 98%. Further, we are maximizing the productivity of the most critical element of deterrence—people—by decentralizing authority and responsibility, promoting competition and encouraging initiative and innovation.

Our people are working more effectively to get the most from our current systems. Although investments in B-52 and Minuteman upgrades, and readiness have made a substantial difference in effectiveness against hardened Soviet nuclear forces, they leave us far short of the required capability. These efforts—system upgrades and increased readiness—are reaching their limit in improving our ability to address the Soviet threat.

At the same time, the Soviets continue to upgrade, modernize and otherwise improve their strategic forces. The Soviet build up includes specific programs to reduce their offensive forces' vulnerability to a US retaliatory response. They are making the silos containing their most powerful ICBMs the hardest operational silos in the world. They have hardened the associated command control network while constructing large numbers of hardened facilities for the Soviet leadership. They are placing increased emphasis on the mobility of their strategic assets to enhance survivability. They are deploying a new mobile ICBM, the SS-25, testing a second new mobile ICBM, the SS-X-24, and developing mobile command control facilities to match. All this is part of a relentless continuing effort to reduce the effectiveness of US retaliation. Additionally, the Soviets continue to modernize and expand what is already the most extensive strategic defensive system in the world. They are fielding modern, highly capable look-down/shoot-down fighter interceptors with a supporting airborne warning and control system capable of detecting low level penetrating bombers. They are now deploying a new surface-to-air missile, the SA-10, and flight testing another, the mobile SA-X-12. Finally, the Soviets are modernizing the ABM system around Moscow.

If we are to maintain an effective deterrent into the future, we must certainly build strategic forces capable of holding at risk increasingly hard, mobile, dispersed and well defended Soviet strategic offensive forces. The only viable approach to that task is the planned family of accurate, responsive weapons in all three legs of the TRIAD. The ongoing strategic nuclear modernization program is squarely aimed at fielding the needed capabilities across the TRIAD to accomplish that task.

To put the progress of the modernization program in perspective, the first B-1B and the first Peacekeeper missile go on alert in September of this year. The 100 B-1B program is funded, we are partially funded for the missiles required to field and sustain the first 50 Peacekeepers, and we are fielding the first elements of the improved command and control system. It has taken strong Congressional support to bring us to this point. However, the rest of the essential strategic modernization program is still in front of us.

Currently, the greatest and most destabilizing shortfall in our nuclear force structure is in capability to hold at risk hardened soviet ICBM sites and command centers. The shortfall in prompt, hard-target capability is particularly significant since some 75 percent of Soviet nuclear force structure resides in their ICBMs. With the existing imbalance, many of the Soviet's most valued assets could not be damaged to the level required for high confidence deterrence during the critical first hours of a nuclear conflict. That imbalance is highly destabilizing and requires first priority attention.

High confidence deterrence demands that the Soviet war planner be convinced that we possess the forces necessary to promptly disrupt a Soviet attack and preclude successful follow-on attacks. When viewed in this context, quickly improving the prompt hard-target capability of our forces is of paramount importance. Presently, the only near-term solution lies in our Peacekeeper ICBM. Acquiring the capability inherent in this highly successful and precise weapon is essential to redressing the shortfall in prompt, hard-target capability. It is this perspective that makes clear the requirement for a full complement of 100 Peacekeepers. Until we possess that level of prompt retaliatory capability, the disparity in the military capability of US and Soviet nuclear forces will continue.

To complement Peacekeeper deployment, the Small ICBM continues on schedule for deployment in the early 1990s. This missile will add prompt capability to strike the full range of Soviet targets throughout the spectrum of nuclear conflict. Deployment in a survivable basing mode will complicate Soviet planning and targeting, and provide added deterrence with the capability to endure through even a prolonged nuclear attack.

Our enduring strategic forces will be further enhanced by modernization of the sea-based leg of the TRIAD. When the Trident D-5 missile is fielded later in this decade it will add much needed counterforce capability and strategic force planning flexibility.

Turning to bomber modernization, the President's strategic modernization program directed a dual-track approach. The bomber is clearly the most flexible strategic asset and contributes over 40 percent of the total attack capability of the

TRIAD. It can readily perform the essential tasks of real-time damage assessment, striking relocatable targets and providing follow-on coverage to achieve required damage levels.

The dual-track bomber program calls for deployment of the B-1B and aggressive development of the Advanced Technology Bomber [ATB]. The first B-1B bombers have been delivered to SAC within cost and schedule. The B-1B's small radar cross section, high speed, excellent defensive systems and low penetration altitude provide high effectiveness against improving Soviet defenses. It will be able to penetrate Soviet defenses of the nineties and strike hard targets which are less time-sensitive and other targets throughout the Soviet Union. In the longer term the B-1 will be equipped with cruise missiles as the ATB assumes the high threat penetration role.

The ATB will be effective penetrating bomber well into the twenty-first century—assuring continuing ability to penetrate even the most sophisticated defenses. Combining low observable features with advances in propulsion technology and light—weight materials will ensure ATB's penetration capability and survivability. Incorporating the latest improvements in sensors and avionics will provide this bomber with the adaptability needed for the future. Fielding the ATB will ensure a highly credible capability against the full spectrum of Soviet targets—fixed, hardened and mobile. The ATB is the most promising weapon system to counter the relocatable target threat. Additionally, the ATB will greatly stress Soviet defenses and force continuing Soviet expenditures on improved defenses. Soviet investment in defenses would otherwise be available for offensive forces.

Greatly improved strategic command and control is essential to deterrence today and in the future. Our current command and control network is undergoing an extensive technological update to ensure a robust capability in the face of more capable Soviet forces. The current modernization program is overdue. Since initiation of the President's modernization program, we have made substantial gains in correcting command control system shortfalls but the highest payoffs are yet to come. To ensure these payoffs, we must sustain progress and continue to modernize strategic command and control. Robust command and control—systems that are as survivable as the weapons systems they support—enhances deterrence by providing reliable and timely warning and assured strategic connectivity between the leadership and nuclear forces.

Finally, professional, well trained, high quality people are the most essential ingredient of our deterrent capability. It is vital that we continue to adequately compensate our people for the unique demands of military service and continue the full range of programs that attract, retain and motivate quality people.

In summary, since the initiation of the strategic modernization program we have made much progress toward building a strategic force capable of ensuring long-term deterrence. The strategic modernization program was conceived as the minimum needed to restore the nuclear balance. The threat has increased since the program was conceived and the need is even greater than before. This comprehensive program is still several years from completion and it will not be quickly or easily completed. But, the most certain, lowest cost path to adequate deterrence remains a commitment to seeing the program through to completion. Much of the investment has already been made and we are seeing the early new systems delivered now while development of follow-on systems is progressing well. With the continued support of Congress we can build a stable deterrent posture that promotes a safer and more peaceful world.

Senator NUNN. General Welch, first, welcome to the committee. I believe this is the first time you have been here as head of SAC.

Welcome. We are delighted to have you. You have got a great background, and we look forward to working with you.

One of the most difficult issues we are faced with this year will be the whole question of the ATB and the B-1. The House hasn't taken a position yet, but my understanding is that the ATB may be in much more difficulty over there than in previous years, at least in the committees. Some people have suggested that we should procure more B-1's. They are cheaper than the ATB, or that's what the allegations are; while others argue that we need the advanced capabilities of the ATB.

Could you give us your perspective of those two systems in terms of how you see the ATB now and its priority?

General **Welch**. Yes, sir, I would be glad to.

I think the B–1B was the right interim bomber. That is what we set out to build. The B–1 will give us the penetration capability we have badly needed for this interim period. Beyond that, it will be a very effective cruise missile carrier, it will be an effective penetrator in some of the moderately defended areas, but it is very clear to me that the bomber of the future is the advanced technology bomber, and let me talk a little bit about why I think that is true.

In the first place, the advanced technology bomber is a superb design, even were it not Stealthy. By that I mean it is more efficient, [deleted] and [deleted] it can do things that no other bomber now flying can do for us.

Senator **Nunn**. If you had your choice between the B–1 and the Stealth with the same radar cross section, in other words, take away the Stealth advantage in the radar cross sections, just airplane versus airplane with the same radar cross section, how do you compare the two and which one would you choose?

General **Welch**. [Deleted] and certainly that gives the ATB an advantage in efficiency that we don't get out of any other aircraft.

But so when you ask a question like that, I get the bird in the hand syndrome, so let me drop the bird in the hand syndrome and assume I have both aircraft available to me, today, I would take the ATB.

Senator **Nunn**. Even without an advantage in Stealth?

General **Welch**. Yes, I would take the ATB if I had both aircraft available to me today.

Now, let me address the cost issue.

Senator **Nunn**. I think that is very important because so many people are putting out so much bad information on this, and we aren't able to respond to it because we don't have the information we can put out.

Could we use this—could we quote you as having said that without getting into the various characteristics? Would you believe that to be classified? Senator Goldwater and I tried to get some information from the Pentagon unclassified and we haven't succeeded so far.

General **Welch**. There is no question, Senator, that that is classified.

Senator **Nunn**. The fact that you would take the ATB even if it was the same?

General **Welch**. [Deleted.]

Senator **Nunn**. I am just not saying the details, but just side by side, if you had one versus the other with the same radar cross section, that you would take the ATB, without getting into why, would that be classified?

General **Welch**. I could hardly see how that could be classified.

Senator **Nunn**. You would not think that would be classified?

General **Welch**. I think that would create for me a lot of opportunities to explain things, but I do not think that would be classified. I am a very strong supporter of the ATB. I would be perfectly willing to answer questions on behalf of the ATB.

Senator **Nunn**. My time is up, Mr. Chairman.

Senator **Warner**. Senator Goldwater?

Chairman **Goldwater**. I have no questions at this time.

Senator WARNER. Would there not be another aspect of Senator Nunn's question in response, and that is the ATB role in this area of the relocatable or what we call the maneuverable, mobile strategic forces the Soviets are coming on line with?

General WELCH. Yes, sir.

Senator WARNER. Now, the ATB, is that the first line against that system?

General WELCH. It clearly offers the best opportunity to deal with relocatables. And by its very nature, the relocatable takes a certain amount of search to be sure it is where you think it is.

Senator WARNER. So what you are saying, an ATB aircraft is, A, [deleted] and B, [deleted] because they are not getting in some instances real time target data before they arrive over their mission area.

General WELCH. I would think their effectiveness in doing that would depend on [deleted].

Senator WARNER. The accuracy of the what?

General WELCH. [Deleted.]

Senator WARNER. Right.

General WELCH. And their effectiveness in doing what you just described would depend on how large the area is. But an ATB, after a very substantial [deleted] which would obviously [deleted] this mission——

Senator WARNER. I am missing a word or two. After a [deleted].

General WELCH. After [deleted] a fairly [deleted] which would obviously [deleted] any such attack, the ATB can [deleted] a short period of time.

Senator WARNER. Let's talk about that [deleted]. I am not being argumentative. I am just trying to get it clear in my mind.

The aircraft [deleted] and what means of detection would you be using, [deleted].

General WELCH. [Deleted.]

Senator WARNER. [Deleted.]

I am really interested in this, and I want to bear down on it a little bit more within my time allocation.

Take the [deleted] scenario out because while it is a tactic it doesn't concern me because there is no [deleted] there. In the [deleted] tank environment indeed there is, but you are using an [deleted]. Here we are using—well, no one knows what that ATB is going to be at a unit cost, [deleted] looking for some SS–20, and again, if you are [deleted], you have got to be at what [deleted], [deleted]. Of course, it depends on the [deleted].

General WELCH. It depends on [deleted]. You could [deleted]. One of the attributes of the SS–25, which is what we are talking about, and of course, the SS–24 will be even more confined because it is rail mobile, is that [deleted]. In the case of the SS–X–24, which will be rail mobile, [deleted].

Senator WARNER. All right. Given that, though, the Soviets could put in, it seems to me, a relatively cheap defensive ground-to-air system if it is going against an [deleted].

General WELCH. If you discount the fact that some [deleted] have been [deleted] on the Soviet defense system, then I would agree with you, there is absolutely no change in my mind that you can take a manned bomber in and do what I just described without that [deleted] that mission.

Senator WARNER. So part of that [deleted] is in the [deleted] area that you are describing?

General WELCH. Correct.

Senator WARNER. So he is going into an area that has been [deleted].

General WELCH. It would obviously be necessary.

Senator WARNER. Practically [deleted], I would suppose.

General WELCH. Well, [deleted].

Senator WARNER. I would like to call on Chairman Goldwater at this time.

Chairman GOLDWATER. I just have one question, General. As Commander in Chief of SAC, you are primary manager for land-based tanker assets, is that correct?

General WELCH. That's correct, sir.

Chairman GOLDWATER. Do you know of any time in the last 4 years when the Air Force failed to meet Navy aerial refueling requirements?

General WELCH. No, I do not. I know of a great many times in the last 4 years when we have cooperated fully with the Navy and had very successful air refueling operations with the Navy. I know of no case where we failed to provide it.

Chairman GOLDWATER. Do you know of any justification, then, for the Navy buying their own land-based tankers?

General WELCH. No, I do not, sir. We are currently negotiating an agreement with the Navy to provide them new kinds of air refueling service for new concepts of naval operations that require more air refueling service than they have used in the past. We have embarked on a program to modify a number of KC-10's with three drogues, for example, in order to better accommodate carrier-borne fighters with Air Force tankers. We have practiced those operations in the Pacific with the Navy. We had a very successful and fairly massive operation with the carrier *Saratoga* just before Christmas where we provided complete Air Force KC-10 air refueling support from the deck for the planes on the *Saratoga*. That all worked great, and the naval commander was very pleased with it.

And I think that we can provide very efficient land-based tanker support.

Chairman GOLDWATER. Thank you.

That's all I have, Mr. Chairman.

Senator WARNER. Thank you, Mr. Chairman.

Mr. Exon.

Senator EXON. Mr. Chairman, Senator Gore asked to be accommodated. He had another meeting——

Senator GORE. Mr. Chairman, that was before another member of the subcommittee arrived. I am meeting with the surviving families of the Gander crash.

Senator WARNER. If you have questions, please propound them.

Senator GORE. Is that all right? I appreciate your courtesy so much in letting me be here.

General Welch, thank you for your fine testimony. I found it very educational.

Just a few brief questions.

First of all, on one of your viewgraphs you indicated that the hard target kill probability of the Midgetman is [deleted] is that correct?

General **Welch**. That's correct.

Senator **Gore**. Is it fair to conclude from the very high figure that your targeting strategy would probably be based on a [deleted] approach?

General **Welch**. That's correct.

Senator **Gore**. So you would have a [deleted] percent confidence level that one Midgetman would knock out the target on which it was dropped?

General **Welch**. That is correct.

Senator **Gore**. Second, in another viewgraph you referred to the appropriate response capability in a postattack environment.

General **Welch**. Yes.

Senator **Gore**. Is it correct that SAC feels that during a postattack environment there can be advantages in expending our remaining warheads one at a time rather than in plural increments?

General **Welch**. There are certainly postattack situations where you would find it very useful to have either low MIRV or single warhead, certainly.

Senator **Gore**. Third, one of the distinguishing characteristics of the Midgetman as opposed to the D-5 on your viewgraph [deleted].

General **Welch**. That is correct.

Senator **Gore**. Some have raised what would have at one time been considered a heretical question, and that is do we really need a land-based deterrent. I am sure you have heard that new question raised.

I take it you are not one of those who raise that question, are you?

General **Welch**. No, I certainly am not.

Senator **Gore**. Fourth, in response to Senator Nunn, you showed the graph that illustrated our capability to cover Soviet hard targets after the modernization program had proceeded. You did not have a graph, and I understand why not, because this is not the thrust of your testimony, but I just wanted to ask this, you didn't have a graph showing what would happen to the ability of Soviet warheads to cover our target sets in the aftermath of our modernization, correct?

Now, the point I am leading up to is this: If you looked at the second side of that graph, at the current time your graph illustrates the ability of the Soviet Union to more than cover U.S. strategic targets.

Do you agree that in addition to increasing our ability to cover their targets, we also should have as one of our goals the ability to frustrate the Soviet Union's capability to cover all of our targets?

General **Welch**. I certainly do.

Senator **Gore**. Now, are you familiar with the Ballistic Missile Office's study of what the deployment of Midgetman in a hardened mobile launcher does to the Soviet capability to cover our targets?

General **Welch**. Yes, I am.

Senator **Gore**. Could you summarize that briefly for the subcommittee?

General **Welch**. Well, what it says is that targeting from several different starting points, and let me take as an example deployment on large land bases in the southwest United States, that we would need [deleted] square miles of area, which is what is judged as being a large enough area so that the Soviets can't target that area, and that is in essence what that study says.

Senator **Gore**. So just to summarize and conclude, after deployment of Midgetman, your graph would be changed so that the ability—the U.S.S.R. strategic forces capability to cover our target set would shrink down to a level where it was even with or below the graph representing U.S. strategic targets.

General **Welch**. It would shrink.

Senator **Gore**. And given enough warning time, 15 to 20 minutes, and if it was 30 minutes, then it would go below U.S. strategic targets.

General **Welch**. Against that set of targets, yes.

Senator **Gore**. Thank you again for your courtesy, Mr. Chairman.

Senator **Warner**. Thank you, Senator Gore, for joining us.

Senator Wilson first, and then Senator Exon.

Senator **Wilson**. Thank you, Mr. Chairman.

General, let us suppose in the hypothetical that were we to achieve 100 MX and 500 small mobile missiles as is contemplated by the Scowcroft Commission recommendations, setting aside the arms control element for the moment, I take it from what you have said today in your presentation that you are conceiving the small missile as primarily a post-SIOP response. And I am wondering in that connection whether you agree or disagree with a Congressional Research Service study recently released on the small mobile missile that indicates that deployment of 500 could be easily and relatively cheaply countered by the Soviet Union, by the device of simply increasing their number of offensive weapons.

General **Welch**. Well, let me comment on that.

We would contemplate about [deleted] because we need something on the order of [deleted] or so prompt response, high capability warheads, but that doesn't change the thrust of the question.

I have said before that it is not impossible to deal with mobile targets.

Senator **Wilson**. Not impossible?

General **Welch**. Not impossible to deal with mobile targets, and it is still not impossible to deal with mobile targets. Simply increasing the number of targets that are mobile that you have to deal with doesn't have any impact on the secure reserve force. The secure reserve force is there to be used for whatever we need to use it for. So unless the Soviets can successfully attack that force, then I would disagree that they can negate the advantage that we get from the mobile ICBM.

Senator **Wilson**. Well, would you agree that our situation is quite different from that of the Soviet Union in that our deployment of a mobile missile of whatever size, assuming that we have adequate mobility, is nonetheless confined to a rather restricted geographic area, assuming a dash strategy?

We are talking about a relatively limited area in which the Soviets, knowing the boundaries of that area, would be engaged in a barrage. This is the thesis, incidentally, of Chairman Aspin's analysis, and his conclusion, by the way, is that MIRV'ing a mobile missile is a process to which the survivability is indifferent. In other words, with the result, he says, you have got the same number of missiles surviving a Soviet barrage, assuming the maximum dash capability.

Do you agree with that?

General WELCH. Let me comment on that.

I think that we need to stay focused on the key factor, and that is it is the size of the target area that you can generate in the time available to you that determines the survivability of the mobile missile, and that before we can answer the question with any fidelity on what the impact of MIRV'ing is on the survivability of the missile, you have to know the answer of how fast can it dash if it gets heavier, longer, wider, and how much area can it generate in the warning time available.

Senator WILSON. Let's take the two cases. Let's take the first case where we know what can be done because we are talking about the mobile missile in the current HML. We know how far it can dash. We are still limited in land area, far more limited than in the Soviet Union. The CRS study is predicated on that fact, and it makes the statement categorically that by doubling the number of defensive warheads devoted to that barrage, 500 small missiles could be taken out of action.

General WELCH. Oh, I see, just by increasing the warheads from 4,000 to 8,000. Clearly, clearly you can put enough warheads onto a small ICBM field to barrage the area and destroy whatever is in there. The question, of course, comes, what is the price of doing that, and furthermore, the assumption is that there is some limitation on the total number of warheads that the Soviets can build. If there is no such limitation and the Soviets can build endless numbers of warheads, you are right, all they have to do is put more and more warheads into that deployment area, and the confines of that deployment area are known. They are both based solely on the warning time that we would have to disperse.

Senator WILSON. That's right. I can't comment as to the fact that it could be done cheaply. They say it can be done easily and cheaply.

Let me just ask this. If in fact we are talking about a decision as to whether to MIRV or have a single warhead mobile missile, given the advantages that we attach to mobility in terms of survivability and stability, then don't you think that if by MIRV'ing we can achieve the same kind of mobility and therefore lose no survivability and greatly save on cost, that that is worth taking the time to find out?

General WELCH. My position on that is we need the solid engineering answers to answer your question.

Senator WILSON. Well, I couldn't agree more.

General WELCH. We have been directed by USDR&E to go get those answers, and I clearly agree that we should go get those answers and then make the decision on whether or not we ought to redesign the small ICBM.

Senator WILSON. All right, my time is up, but let me just ask this one last question.

In terms of cost, you have talked about the Scowcroft Commission requirement and you have talked about the requirement for hard target kill capability. If we get only 50 MX, if Congress decides, however unwisely in your judgment and in mine, that that's the limit, then if we are going to look to the small mobile missile in the present single warhead configuration to make up the balance, we are talking about, according to most cost estimates, somewhere between $88 billion and $100 billion.

My own thought is that that is unrealistic at a time when competing with those dollars are programs for ATB and Trident. I would be curious as to what your response is as someone who is compelled, given your responsibility, to be practical about what can be achieved with the dollars that will be available.

General WELCH. I think that an affordable strategic nuclear force that does that job I described has to have as its basis 1,000 Peacekeeper warheads. If you try to make up for Peacekeeper warheads with additional small ICBM warheads, the cost ratio is 5 to 1. And I don't think that we can afford to make that 500 Peacekeeper warheads at a 5 to 1 cost ratio.

Senator WILSON. Would you recommend our trying to do that?

General WELCH. I think we need 1,000 Peacekeeper warheads as the basis and the 500 small ICBM warheads added to that, which was the original intent.

Chairman GOLDWATER [presiding]. Jim.

Senator EXON. Mr. Chairman, thank you very much.

General, let me welcome you. I want you all to know that the General has reached a new peak in his distinguished career, and he also now has the privilege of serving in that Garden of Eden called Nebraska. I apologize for bringing him out of that paradise here to this affair.

I do want to ask you a parochial question, though.

Senator LEVIN. That sounds pretty parochial.

Senator EXON. How is our new hangar coming, which was funded by the committee some time ago? Is it in operation yet?

General WELCH. Well, phase 1 is nearing completion, it is under roof so we can work on it in the wintertime, and it will be a great addition to the operation of Offutt Air Force Base.

Senator EXON. Thank you.

Let me ask you a question about the penetrating ability of the B-1. We have had conflicting testimony in our committees and subcommittees on this.

In your opinion, General, given the Soviet improvements that we anticipate, what year in the 1990's will the B-1 no longer be an effective penetrator?

General WELCH. That's a very difficult question to answer. Let me give you my insight on it, and you will understand that is all it is because I have no crystal ball all that much better than the intelligence community.

I think that by the [deleted] we are going to find that [deleted]. Now, the reason why you can't answer the question when can it penetrate and when can it not penetrate is because the real question is when will the losses become higher than you think you can stand. So the right way to answer your question, I believe, is that we expect by [deleted].

For years to come the B-1 will be able to penetrate [deleted] and there are a lot of targets to be covered there. The great beauty of the ATB/B-1 combination is the ATB actually leverages the useful life of the B-1 [deleted].

Senator Exon. As a follow-on question on that with regard to the ATB, to the best of your knowledge, given the caveats that you have used—and I anticipated that in the question—you view the ATB as an effective penetrator in the foreseeable future and far, far better than the penetration ability of the B-1?

General Welch. I do.

Senator Exon. Now, following on that, there was a recent story in the local newspaper or papers within the last week about raising all kinds of problems about the ATB that this Senator was not aware of. I certainly know that we have got some stability problems at certain levels of flying, and so forth and so on. This raised that old bugaboo problem, you know. It also raised questions about the basic design of the ATB, as to whether it would ever be a properly flying aircraft under any circumstances.

Can you clarify that speculative story? We hear these things here, and I think it is best that we put them to rest as best we can, especially on as highly classified aircraft as the ATB is.

General Welch. Well, I certainly don't know the source of that speculation you describe, but let me say that the ATB has [deleted] hours of wind tunnel time. I know of [deleted] the reason for [deleted] wind tunnel time is because we recognize that there is some concurrency in the development of that aircraft. But there is not the slightest doubt in the mind of any engineer that I have talked to about the flying qualities of the ATB. In fact, one of the early risk reduction efforts that we put a lot of effort into on the ATB goes to exactly that question, mostly related to the [deleted]. But I know of no reason for concern about the flying qualities of the ATB.

Senator Exon. In this speculative story, it went also into such other alleged concerns about the ATB complaining that because of its load capability, it would not be an effective carrier of air-launched cruise missiles. As near as I can tell, we never really designed or intended that airplane to be a cruise carrier, did we?

General Welch. [Deleted.]

Senator Exon. General, thank you very much.

My time is up, Mr. Chairman. Thank you, Mr. Chairman.

Senator Warner [presiding]. We indicted Senator Levin would come next.

Senator Thurmond, is that agreeable to you?

Senator Levin. I would be happy to yield to Senator Thurmond.

Senator Thurmond. That is all right. Go ahead.

Senator Levin. Thank you, Mr. Chairman.

First, let me add my congratulations to you and to SAC for your anniversary which I gather is tomorrow.

Let me pick up where Senator Exon left off on the ATB first. You have answered this in a way that I would like to pinpoint the questions in a slightly different way.

We hear all the time it is a paper bomber. That's what we hear out there in the hustings. Those of us that defend ATB out there are told that it is just a paper bomber. Now, as I tell folks out there, [deleted].

What is your answer to the charge that it is a paper bomber?

General WELCH. Well, I think at this point in time [deleted].

Senator LEVIN. What do you say publicly? You can't talk about the number of hours of wind tunnel time publicly, can you?

General WELCH. Let me find out. I don't know why wind tunnel time would be classified, but let me find out.

Senator LEVIN. It might be useful if you could give us that information.

General WELCH. Let me find out.

Senator LEVIN. On the IOC question Senator Exon asked you, I think you said still the early 1990's.

Has that schedule slipped at all in the last few years?

General WELCH. No, sir.

Senator LEVIN. [Deleted.] Can you say what year with more precision than just the early 1990's?

General WELCH. I don't think I can. I know what the year is, but I don't think I can——

Senator LEVIN. I think in this setting you can. Not in this setting?

Senator WARNER. That is the advice of counsel.

Senator LEVIN. All right, that's fine.

General WELCH. I can say it has not changed.

Senator LEVIN. OK, it has not slipped.

Relative to that chart, I wonder if we could have your four bar chart up there again.

What you have shown us there are Soviet and American strategic targets.

Are those counterforce targets you are looking at there?

General WELCH. Yes, they are. [Deleted.]

Senator LEVIN. So there are no [deleted] in there that are targeted?

General WELCH. None whatsoever.

Senator LEVIN. Now, does that reflect our SIOP?

General WELCH. Yes, it does.

Senator LEVIN. I thought our SIOP reflected a more balanced response and flexible response.

Is our SIOP limited?

General WELCH. Oh, no, that's the maximum response.

Senator LEVIN. It doesn't contain [deleted]. You mean our SIOP doesn't contain [deleted]?

General WELCH. Our SIOP contains [deleted] under no options per se.

Senator LEVIN. Pardon me?

General WELCH. Our SIOP does not target [deleted] under any option.

Senator LEVIN. Under any option?

General WELCH. No, sir.

Senator LEVIN. So that that bar you have got up there for U.S.S.R. strategic targets reflects our SIOP?

General WELCH. That reflects the maximum SIOP response. There are a great many SIOP options much smaller than that. That is the largest.

Senator LEVIN. That's what I mean.

General WELCH. That is the largest SIOP response.

Senator LEVIN. But that is the actual SIOP, maximum SIOP?

General WELCH. That's correct.

Senator LEVIN. And do we know what the Soviet SIOP is?

General WELCH. The bar that you see for the United States is based on [deleted].

Senator LEVIN. That they [deleted].

General WELCH. That's correct.

Senator LEVIN. Now, if we executed that SIOP, that maximum SIOP that you show up there, what would be the loss of Soviet lives, population? Do we know roughly?

General WELCH. Massive.

Senator LEVIN. What would be the loss of our lives if they executed their SIOP?

General WELCH. Massive.

Senator LEVIN. Given that there would be a massive loss of Soviet lives, would you say that we presently have deterrence, even though it may not be, as you phrase it, maximum deterrence?

General WELCH. That would depend on what you assume the Soviets hold in highest value. We don't assume an asymmetry of interests between the United States and the Soviets. We [deleted], and our best judgment, based on the very extensive study, is that the Soviet value most [deleted]. Certainly I would not characterize the Soviets as being indifferent to the losses of Soviet citizens, but I would characterize them as having that at least as their [deleted] priority, not their first priority, while in our case it is first priority.

So there is no symmetry in interests between we and the Soviets when it comes to the deterrent equation.

Senator LEVIN. If I could just include this question with one other that is related, then, in your opinion, is our current level of deterrence adequate?

General WELCH. Our current level of deterrence is minimally adequate and deteriorating.

Senator LEVIN. Thank you.

Senator WARNER. Senator Thurmond.

Senator THURMOND. Thank you, Mr. Chairman.

General, we are glad to see you and welcome you here.

I just have a few questions here I want to ask you, and I will want to ask some more for the record.

On page 3 of your statement I notice you say that the task is to provide and operate the forces necessary to assure both the fact and Soviet perception that we have the capability to deny their objectives. Do we have the capability today in your opinion to deny the Soviets their objectives as you understand their objectives?

General WELCH. Let me say that I believe that at this moment that we have minimum effective deterrence, and that if we continue on the President's strategic modernization program that deterrence will improve, but that if we continue to slip and drag while the Soviets continue to improve their forces, that deterrence will begin to deteriorate.

But as of this moment, I believe the balance of forces do provide a minimum level of deterrence against the Soviet forces.

Senator THURMOND. Have you made any statement as to what you recommend that we be doing that we are not doing?

General WELCH. Again, sir, my recommendation is simply that we keep the strategic modernization program on track as scheduled, and that will be a perfectly adequate program to ensure future deterrence.

Senator THURMOND. Do you feel it is on track now?

General WELCH. No, I feel that the second 50 Peacekeepers is a serious slip in the President's strategic modernization program. However, we have accepted the direction of both houses of Congress to come back with a more survivable mode for the second 50 Peacekeepers, and I would expect that we would be able to come back to you with that proposal for the 1988 budget. We are not prepared to address that in 1987, but let me say that I am greatly concerned that we are not addressing that in 1987.

Senator THURMOND. Now I want to ask you this.

Are your pilots getting the flying hours that you feel they need in order to be equipped to operate these planes as they should?

General WELCH. I think that on balance, Senator Thurmond, that in the B-52 and the F/B-111, for example, that we are getting about the right level of flying hours when you balance the peacetime workday and all of the other things that the crews need to do to be combat ready, and we are able to fly our B-52 crews about 25 hours a month, and that's about right.

My concern is with the tanker crews because our KC-135 crews are not getting enough flying hours to be as proficient as they should be. They are averaging about 17 hours per crew, and we should be at least 20 hours per crew. We had some cuts in KC-135 flying hours last year. This committee was very helpful in minimizing those cuts, but we would certainly like to ensure that there are no cuts next year.

Senator THURMOND. How much longer do you think we will be able to use the B-52's effectively?

General WELCH. We would expect that the B-52G in [deleted] will begin to move into the [deleted] and we would expect it to be effective in that role until about [deleted] we will begin to retire the B-52G.

The B-52H, which is the newest group of B-52's, will begin to revert to the cruise missile carrier in the early 1990's, and I expect the B-52H to be effective as a cruise missile carrier through most of the 1990's. So we would expect a 1995 force, for example, of [deleted].

Senator THURMOND. Do you believe in mobile ICBM's or do you feel that the same money could be more effective in some other way?

General WELCH. I think the first priority is to redress the imbalance in total hard target attack capability, and I think the way to address that imbalance as quickly as possible at the lowest cost is with the Peacekeeper missile. Given that we field the Peacekeeper missile, then I feel that the small ICBM in a mobile mode with however many warheads, as long as it is still mobile enough to generate a large area, greatly complicates the Soviet planners' targeting problem, provides us with secure reserve forces that we can get in no other way, and would be a very valuable addition to deterrence.

Senator THURMOND. My time is up. I have a few more questions. If you will answer them for the record, I would appreciate it.

General WELCH. I would be glad to.

Senator WARNER. We will now start the second round of questioning.

Chairman GOLDWATER. I have just a couple, General.

What operational threat or other factors are driving the current pace of the small ICBM Program? Is initial operational capability or full operational capability of this system the more relevant milestone from a military perspective?

General WELCH. I think the threat that drives the requirement for those warheads—let me say that differently. I think the threat is the threat that drives the number—the requirement for the total number of warheads, and that we already have out there about [deleted] that we are at some risk, and the risk is dependent on the number of those targets that we don't cover.

So the urgency in my mind is to replace the existing warheads with hard target capable warheads that can address those critical targets.

Now, we have embarked on a program that we would cover [deleted] of those with Peacekeeper and we would cover the next [deleted] or so with the small ICBM. And so I think the urgency of the small ICBM is to get those [deleted] warheads. We have never suggested that we would buy more than [deleted] Peacekeeper warheads, so I presume the only means at hand to add those additional [deleted] warheads is to do so with the small ICBM, and that is the urgency, Senator.

Chairman GOLDWATER. Well, now, we don't know yet what the cost of the Midgetman will be, or even about what it will be, but let's suppose that it is in the same ballpark as the MX.

Would you prefer the Midgetman or the MX?

General WELCH. Senator, I would prefer [deleted] Peacekeeper followed by [deleted] small ICBM's. I think that is the right program. I really do.

Chairman GOLDWATER. Well, there is no question of how you feel on it.

One more.

In your role as operational commander, what are the unique military attributes of a single warhead ICBM in contrast to an ICBM with two or three warheads?

General WELCH. The only difference that I can see in those two is the ability to generate a large enough target area for it to be an effective mobile missile. There are a couple of factors worth mentioning, and that is there are two modes being considered for how to deploy the mobile missile. One is to start them out from the existing Minuteman sites, park them on existing Minuteman sites, when we get tactical warning we scramble from there. One is to park them on large DOD land areas in the southwest United States and roll around with a number of them and then scramble from there on tactical warning. And what we have to work out is what is the mobility of the various weights of small ICBM's, the one warhead, two warhead, three warhead, what does the weight do to the mobility, what do we have to add to the hard mobile launcher to buy back the mobility if that is necessary, so we can determine what the cost and effectiveness numbers are of heavier, small, ICBM, and we have been directed in the Air Force to provide that information by Dr. Hicks, and we are currently embarked on a program to do that.

Senator WARNER. By what date, did you say? Is it in the December DSARC?

General WELCH. I believe it is December.

Senator WARNER. Well, it should be before the DSARC.

General WELCH. He asked more questions than we can answer. When we get down to the number of questions we can answer, I can tell you what the date is.

Chairman GOLDWATER. That's all I have, Mr. Chairman.

Senator WARNER. Thank you, Mr. Chairman.

I will just follow on with my questions on the small missile after the chairman.

The issue confronting Congress right now is the determine where we can take cuts in the program to presumably meet the mark set by the Budget Committee. We have a distinguished member here.

Is that thing final? Has it been reported to the floor now?

Senator EXON. The Budget Committee is recommending $295 billion which is explained as a freeze, with inflation. Out-years would have 1 percent real growth.

Senator WARNER. So its a reality, then, is it not, Mr. Exon? The committee has reported it?

Senator EXON. It has been reported to the floor.

Senator WARNER. So pending floor action, we have got to look at it, and I am sure as I am sitting here and you are sitting there, one of the targets is going to be the mobile missile program to be cut because there are credible arguments being raised in favor of MIRV, and that says, well, if they are credible arguments, then maybe we should slip the program.

How would you respond to that?

When can we get a hard fix in terms of an answer? That's the December DSARC.

General WELCH. I think we are both in a very difficult position on that question.

Senator WARNER. Except I have got to answer them.

General WELCH. I think the right approach is for you to tell us to get you those answers in time to make your decision.

Senator WARNER. Well, I am not certain—I am sure the Secretary of Defense thought through this scenario when he established the December DSARC, and that is at the end of the fiscal year, but there might be the hue and cry raised, well, let's take the money out now and they can always come back in December, and we can look at it in a supplemental at the first of the year.

So I guess my specific question is, first, you would be in favor of raising the weight limit restriction, or that is, amending the law to allow a 37,000 to 40,000?

General WELCH. Oh, yes, sir.

Senator WARNER. That seems to be a minimum.

General WELCH. I think it is clear that it needs to be able to accommodate the penaids in order to provide some assurance against Soviet ABM breakout.

Senator WARNER. Now, I listened very carefully to your responses to Mr. Levin, and then I think questions by Mr. Thurmond, and to Mr. Levin you said our deterrence is "currently adequate but deteriorating." Excuse me, minimal, minimally adequate, and I copied "currently," and I think you said minimally the next time.

But let's go back over that.

Explain the word "deterioration." Does that suggest we are going to approach another one of these windows of vulnerability?

General WELCH. No, not at all. In fact, I used too much shorthand with Mr. Levin. I liked the answer to Senator Thurmond better.

Senator WARNER. I thought I understood that one better.

General WELCH. It will deteriorate if we don't keep the President's modernization program on track as we currently see it.

Senator WARNER. But the second 50 MX, as I read the law today, is not part of the President's modernization program. The judgment has been made by the Congress not to exceed 50, but it gives the administration the opportunity to come back and request an additional 50 if he can persuade the Congress as to its survivability.

So I don't think that can be counted, in my judgment, in the law as part of the budget program, that second 50.

General WELCH. And I would say without the second 50 on some reasonably timely basis, that indeed there will begin to be another slip in the balance.

There will begin to be new deterioration in the balance which we will all be very uncomfortable about because the Soviets continue to improve their accuracy, we see a follow-on SS–18 coming, we see a follow-on SS–X–24, and we require those numbers of high quality warheads that I described in order to counter [deleted] what the Soviets would do with the SS–18 and the SS–X–24.

Senator WARNER. I am going to defer to Mr. Exon.

Mr. Wilson, if you would preside while I'm away.

Senator EXON. Thank you, Mr. Chairman.

Before you leave, I would just like to say that the vote in the House on turning down the Contra aid was 222 to 210.

General, I have one more question to pursue with you.

I thought your answers to Senator Levin and Senator Thurmond were interesting and accurate. But I was a little bit puzzled by your answer to Senator Levin's question regarding your perception of the Soviet threat.

Now, I don't expect you to sit and tell us there is no Soviet threat; we all know there is one. We have difficulty, I think, in putting that into perspective from time to time. I took it from an answer you gave to Senator Levin's question, that you believe that Mr. Gorbachev might think the U.S.S.R. could prevail, in a nuclear exchange if it could sacrifice 50 percent of the Soviet population to wipe out 75 percent of ours. I thought that's what you indicated. I hope I am wrong.

General WELCH. No, I don't think Mr. Gorbachev is that bloodthirsty at all. My answer to Mr. Levin was simply a matter of what are the priorities on the things that the Soviets are most interested in protecting, and it is clear to me that the Soviet priorities put [deleted].

They are obviously willing to sacrifice a great deal for their heavy industry and their scientific advancements, and they are vitally interested in controlling NATO. And so what I said is I simply don't see any symmetry in the interests between the United States and the Soviets or any symmetry in what we would give priorities to.

While our first priority is the United States population, we don't find the Soviets' first priority to be the Soviet population, and that answer was in the context of the strategy. Mr. Levin asked why can't we deter the Soviets simply by holding their population at risk, and my answer is because that is not what the Soviets value most.

I would never answer that I think Mr. Gorbachev is sitting over there waiting to unleash a nuclear war and willing to trade off half the Soviet population to do that. I don't believe that he is an irrational man.

Senator EXON. Thank you. I misunderstood the question, and I wanted to give you a chance to straighten it out. I agree completely with the version that I just heard, and I am sorry that I misunderstood you the first time.

One last question, Mr. Chairman.

Can you give us a little thumbnail sketch as to how we are coming and what options we are pursuing for Midgetman basing? I know that you are looking at several options, and I guess nothing has been definately decided yet.

Senator WARNER. That is a good question. I am interested in that very much.

Senator EXON. For example, are we thinking of using any of the old Titan silos for Midgetman? Are we exploring all military bases for Midgetman basing? Would Midgetman go out on a highway or over land someplace in case of warning?

General WELCH. Yes, sir, we are currently looking at a number of basing modes, but I would narrow it down to three that are seriously considered. One is the Midgetman superhard silo that is quite expensive. You understand that mode. I will say no more about it. The other two are two different modes of deploying a hard mobile launcher. The one mode would deploy the hard mobile launchers on existing DOD land which would probably be mostly the large DOD land areas in the southwest and in the Utah areas. Some part would be in garrison on a day-to-day basis, some part would be out roaming randomly about the edges of that DOD land on a day to day basis, with sufficient security to make that a safe thing to do.

The other mode we are seriously considering is parking the hard mobile launcher on existing Minuteman sites in peacetime, again taking advantage of the command and control and security that is already there, and in either case, whether or not we put them on existing Minuteman sites in peacetime or on large DOD land, then on tactical warning which would expect about [deleted] we would dash from those locations to generate this large target area that I talked about.

The thing that will decide in our minds between the DOD land and the Minuteman sites will be the total cost of support and the size of the area that we can generate. That will depend, quite frankly, on the speed and mobility of the hard mobile launcher, whatever that turns out to be as a result of the ongoing investigations. But those are really the two principal modes under consideration at this time.

Senator EXON. If we are going to possibly use the security of what we have now on a Minuteman base, couldn't we expand that also? If we use some there couldn't we also have some of those on relatively small land size bases controlled by the Department of Defense? Lowry Air Force Base in Denver, that is in a downtown area. They can get out very fast. Maybe they could knock that one out. But I am talking about bases where they are adjacent to a highway that you could reach in a short period of time and go as fast as you could down a good road to get the dispersal that you obviously need.

So are we looking at other options, too? In line with that question, how important is command and control of the projected Midgetman as compared to the command and control that you Air Force people have always maintained was necessary with regard to the MX? In other words, are specific areas tied together?

General WELCH. Well, we think that command and control is an important aspect of it. We have looked at literally dozens and dozens of places to put them, including some fairly small Air Force bases and some very large DOD land areas. One of the important considerations is we don't want to depend on public highway in heavily populated areas for obvious reasons. The very thing that would cause you to want to disperse SICBM in an emergency situation is likely to raise havoc with the highways. So that is not a very useful deployment.

So we are looking for places where for security reasons we have lower populations, and also for road congestion reasons we have lower populations.

As far as the command and control, yes, indeed, we are as interested in robust, assured connectivity of the small ICBM as we are of the Peacekeeper. We probably will achieve that robust connectivity through an airborne link which will always be airborne and will probably be the SAC airborne command past. So we think we can solve that problem very handily.

Senator EXON. General, thank you very much for your fine response.

Mr. Chairman, my time is up.

Senator WARNER. Thank you very much.

General, I want to pick up on this question of the interface of this launcher, however it may turn out with the public highway system.

My current thinking is that while there could be considerable difficulty at this point in time in our history operating in such an environment; namely, having one of our mobile launchers on the public highway, we had best design that system so that we have the option at some future date if extreme conditions should occur to have that vehicle operate on the public highways. So my point at this time is it ought to be designed so that it can operate on the public highways in the event we have a contingency in the years to come that would compel us to do it.

Such compelling reasons would override the problems that we would encounter now. That is just one Senator's view on this.

In targeting heavily defended targets, what value do you attach to the supersonic speed of a SRAM in contrast to performing the same mission with a slower, very low radar cross section missile?

General **Welch**. The great value of the SRAM, of course, is that you can launch immediately with supersonic speed, it is virtually undetectable, and it gives you a superb defense suppression capability out ahead of the bomber to take out targets. If you do that with something like a slower ALCM, it just doesn't get out in front of the bomber, so it gets there at the same time the bomber does, and that's not very useful.

Now, the main reason why we, of course, are pursuing the SRAM II at this point in time, number one, we need a more capable weapon, but even more significant, we bought the last SRAM I in 1975 with a 5-year motor life, and it is impractical to repour those motors. In fact, we have determined that it costs more to repour the motors than it does to proceed with the SRAM II. So all those motors are already 5 years beyond their guaranteed motor life. So we are in the position where if we don't proceed with SRAM II in a fairly expeditious manner, we may have all of our SRAM I capability fall off the edge of the cliff before we get the SRAM II based solely on motor life.

Senator **Warner**. I am going to turn now to Senator Wilson, but going back to my statement about the mobile launcher being designed to interface with the public highway system, would you concur in that?

General **Welch**. I like the theory, but that is a very difficult restriction to live with.

Senator **Warner**. Well, supposing we had a serious breakout situation in the Soviet strategic balance a decade hence or a decade and a half hence and we could not very quickly in terms of new systems improve it, we might have to increase the area of operation of these things to enhance the invulnerability.

General **Welch**. Certainly it could be useful to have a certain segment of the public highways that could accommodate that.

Senator **Warner**. Let's not just build a vehicle that can simply not interface. That's why I brought it up.

Mr. Wilson, you will accept my apologies? I have been in and out, and I lost track.

Senator **Wilson**. No apology required, Mr. Chairman. You are the soul of graciousness.

Senator **Exon**. I object. [Laughter.]

Senator **Warner**. We came to the Senate together, Mr. Exon.

Senator **Wilson**. Thank you, Mr. Chairman.

General, let me just ask you, we don't have much time, and you have been generous with yours. But although you have presented your sense of the priorities in terms of achieving the deterrence that is your responsibility, let me ask you to cast it in another way that may be simpler and somehow better adapted to our understanding of our responsibility, which is how we spend money.

If Congress is compelled to face because of budgetary constraints a choice of having to slip something in our strategic programs, then you tell us in your judgment what is it that we should slip? Should it be the Advanced Technology Bomber, should it be the D-5, should it be the small mobile missile? Should it be something else?

General WELCH. Well, of course, the answer to all of that is no.

Senator WILSON. That's not good enough. I'm not going to let you get out of that chair until you answer the question.

General WELCH. Well, we have slipped strategic programs for 20 years. That's how we got in the position we are in right now. We were expecting an increase in the Air Force budget overall over this 4 year period of about $85 billion, and we ended up with less than half of that.

So my point is that when it comes to strategic programs, we have slipped, and we have slipped, and we have compromised, and we have compromised, and now we are asked to compromise once again. And I think it would be exceedingly dangerous to compromise.

I would like first things first.

Senator WILSON. That is the question.

General WELCH. The question is I would like first things first, right down the line.

Senator WILSON. And your list is in order?

What is it?

PEACEKEEPER IS FIRST PRIORITY

General WELCH. Well, the list was on the chart. My first priority is Peacekeeper. My first priority is clearly Peacekeeper, it is here, it is now, it works, and it deters. And beyond that I would have a very difficult time choosing between the children.

Senator WILSON. Let me just say, General, that I think you can provide about as relevant a guidance as anyone to whom we might ask that question, and your choice, if you choose not to choose between your children, is to deny us that guidance, and it would be irrelevant to the process.

General WELCH. I understand that, but I think we also both understand that when I choose between the children beyond that, a lot of people decide that the one child is not very important, and that is just not a fact. All the children are important. So I can't give you that guidance without making a deleterious comment about one piece of the equation, and I'm not willing to do that.

Senator EXON. Would you yield for a brief comment, Pete?

Senator WILSON. Sure.

Senator EXON. I am not sure it is quite fair to ask the General that question. We have asked that question legitimately to the Secretary of Defense, but it seems to me, that if the General had to answer the question, his comments would involve some of the other services. So I really appreciate you trying to get an answer, but at the same time, it is one that I as one member of this committee can understand that the Commander of SAC, may have a most difficult time in trying to answer.

General WELCH. Thank you.

Senator WILSON. Let me just say that you can spend your time seeking to get that response from the Secretary. I am going to pursue the general, because I know the Secretary's response.

Senator EXON. It is the same as his.

Senator LEVIN. He says ask the General.

Senator WILSON. You know, really, I am not trying to be unpleasant. I am being persistent because the real world is that we are going to face budget constraints that may very well compel us to choose between options, all of which we think to be unwise. So the choice facing us may be what is the least damaging decision that we have to make.

I spent 2 hours this morning listening to pleas from the Assistant Secretary for Force Management, from the service personnel chiefs, all articulating, in their words, the urgent necessity that we not reduce force strength, that we maintain the quality of our personnel by maintaining all of the programs, but the reality is that everybody sitting around this table has been through enough of these hearings in the past few years to know that when it comes to the authorization bill, each of the subcommittees on this committee is going to ~~be~~ asked to take a hit. We are going to each be asked to shoulder a certain share of the burden of reduced requests.

So what I am saying to you is that you can either leave that choice to us and we will decide which of your children is more important, or you can make a decision, and I would disagree that your responding to the kind of pressure that I am putting on you implies any kind of editorial judgment.

I think what you need to do, very candidly, is say they are all important, you shouldn't cut any of them. On the other hand, if we are compelled to make reductions, if you, Senator, are compelled to make reductions, then I think the answer is that you should indicate as clearly as you have in stating that the MX is your first priority, what the others are, and our choice is going to be whether we fund ATB, the D-5, the small missile, and in my judgment, we do need a triad, we do need a credible land-based deterrent. But I would have to say that I think you need a strategy that is more flexible simply than insisting on Peacekeeper and leaving to us the choice as to what may have to be sacrificed when we are imposed a choice between a series of unwise decisions.

General WELCH. Well, clearly, the basis for that decision, assuming a deferral and not a cancellation, is to defer that which costs the least to defer, and that's why I made the comment that I would like to see those things come forth in the order that I put them on the chart.

Now, if we can't get everything in the timeframe we ask for, that is entirely different than saying we are going to cancel something and you will never again regain that capability.

Senator WILSON. Well, as I recall the chart, the last thing on it had to do with the small mobile ICBM.

General WELCH. But that doesn't imply it is the least important, it just implies that it is the least far along right now.

Senator WILSON. I think you also said that you support having answers to the engineering questions that relate to whether or not we can save the money by MIRV'ing.

General WELCH. I do. I think that we would be foolish to proceed without having the answers to those questions. I think it would be irresponsible.

Senator WILSON [presiding]. Senator Nunn.

Senator NUNN. I have a few more questions.

Senator LEVIN. Go ahead.

Senator NUNN. General, concerning Senator Wilson's line of questioning for a moment, you mentioned the MX would be first. Are you talking about the first 50 MX's, or are you talking about the second 50?

General WELCH. Well, I am a practical man, Senator. I am talking about all 100, but the first 50 is first.

Senator NUNN. The first 50 is first.

General WELCH. Certainly.

Senator NUNN. Are you including the second 50 with a different basing mode as still the top priority above the other programs?

General WELCH. I am indeed.

Senator NUNN. You assume by that we are going to be able to do that within the time frame that would precede both Trident and——

General WELCH. Oh, no.

Senator NUNN. It seems to me the second 50 may be 3, 4, 5 years down the road by the time we first of all finally find a survivable basing mode, then second, make it acceptable by passing it; third, do all the engineering. You may be talking about the early 1990's before you could even begin on the deployment of that second 50.

Would that be correct?

General WELCH. The second 50 would certainly follow Trident in the timeframe.

Senator NUNN. How about ATB? It might follow ATB also, might it not?

General WELCH. It shouldn't if we get back to you with a reasonable basing mode that you can accept for the 1988 budget. We should be able to begin on the second 50 before ATB is fielded, before ATB IOC. It is going to be close, but certainly Trident is the next thing that comes along behind the first 50 Peacekeepers, and I am a strong supporter of Trident, but I haven't seen anyone challenging that, so I haven't found it necessary to make speeches about it.

Senator NUNN. Let me pursue another line here for a moment.

General, last week our subcommittee heard testimony from both Dr. Hicks and the Air Force to the effect that the requirement for prompt counterforce RV's is [deleted].

Is that also your assessment?

General WELCH. Yes.

Let me say just a word about that without making a long speech. Where the [deleted] comes from I am sure is that there are [deleted] Soviet hardened ICBM launch control facilities that we have to deal with, and that is clearly a class of target that requires a prompt hard target kill capability. In addition to that, there are another [deleted] or so Soviet nuclear forces hard targets that need to be attacked with some degree of promptness, but not with the degree of promptness as those [deleted]. So the [deleted] that Dr. Hicks refers to I am sure has to do with that target set.

Senator NUNN. Could I pursue that a moment?

What do you assume when you say we have got to have hard prompt target kill on that [deleted].

Wouldn't it be almost totally against all likelihood or probability that we would ever go against those unless they had not already been fired?

General WELCH. Not at all, sir. If you look at the Soviet firing order, more than [deleted] of those holes would be occupied. We just don't know [deleted]. In other words, the Soviets don't use anything like that number of missiles for their initial barrage.

Senator NUNN. So you think that there would be, about [deleted] of them would still have missiles in them when we hit them?

General WELCH. Yes, sir, if we respond promptly, and by that I don't mean launch on warning, if we respond within——

Senator NUNN. Is that even assuming a Midgetman deployment and Soviet barrage against Midgetman?

General WELCH. I am not sure I follow the question.

Senator NUNN. Would they have any missiles left in the silos if we deploy the Midgetman and they try to barrage Midgetman? They would have to almost use their whole force then, wouldn't they?

General WELCH. If they attempted to barrage Midgetman, they would certainly use the majority of their reserve force. However, [deleted]. So my estimation is that if they had to use that many warheads to attack Midgetman, that they would elect not to attack Midgetman.

Senator NUNN. I thought their mobile missile force was going to be their reserve force.

General WELCH. Their mobile missile force is not very useful against some of the hard targets that I am talking about.

Senator NUNN. I know it. That is the reason I would say that would be their reserve force. So I am saying why do we need [deleted] missiles to go after their hard targets, which are their permanent force, when it seems to me that would be the force they would use first, first because it is more accurate, second, because it is more vulnerable to retaliation, and third, because the mobile force would be the force that would probably be their reserve.

General WELCH. But my answer was that the whole purpose of deploying Midgetman in this wide area that we talked about is to make it unattractive for them to attack Midgetman. If we assume, in spite of the fact that we have made it extremely unattractive for them to attack it, that they attack it anyway, then you are right, the missile silos would be empty. I simply think the likelihood of that occurring is very, very low.

Senator NUNN. I would agree with that.

In this [deleted] requirement, is this a requirement for survivable RV's, or is this just hard target RV's?

General WELCH. That is a deterrence requirement. My whole point with the [deleted] is that if the Soviets know that we have the capability to target that entire set of targets that I just described, then they know that they cannot achieve their war objectives. So the fact is the existence of those targets means they are survivable because they are not going to attack.

Now, I am not seeking [deleted] hard target missiles in addition to the Peacekeepers in the Minuteman silos. I am seeking [deleted] prompt land-based hard target, high quality warheads as the total requirement against that target set that we have described.

Senator NUNN. You are including the Trident II's in there?

General WELCH. No, I am not including the Trident II in there. You can put the Trident II in there on a [deleted] basis, if you assume that is the best use of Trident, that [deleted]. You have to go [deleted] with Trident to get the necessary damage numbers.

Secondly, the current plan is to carry only [deleted] of the hard target killer missiles on each Trident, that is, to have only [deleted] weapons. The remainder would be the [deleted] weapons, because we need those weapons for the defense suppression on the airfields and other things. So certainly Trident could make a contribution to that [deleted].

On the other hand, we don't intend to count the entire 500 smalls in that [deleted] because we will hold a certain number of those smalls as our strategic reserve force. So Trident plays, but I am not sure exactly in what proportion we would play it. We would have to see what forces actually become available to us.

Senator NUNN. So what would the target classes be for that [deleted]. Would that be all Soviets hard type silos?

General WELCH. Those would be the hard silos. The situation we are in right now, Senator, is that the Minuteman is the only thing that has any capability against the SS-18 or the Minuteman to attack an SS-18. We would have to put [deleted]. We would put [deleted]. So that means if we take the Minuteman and we elevate it to the SS-18 [deleted] then that set of targets that the Minuteman could do very well against, produce a very high PK against, we have to put the most capable weapon on it. And so we stack up a whole set of weapons that are not quite good enough to do the job.

When you start then with a force of Peacekeepers that indeed has the full capability against those hardened targets, then we can use the Tridents on the next class of hard targets where they don't produce [deleted]. So starting with the capability against that toughest set of targets, that [deleted] that we are talking about, we maximize the capability of every other piece of this puzzle that we talked about.

Senator NUNN. This is out of the blue, and if you would rather think about it a while, I would certainly understand that, and I am not sure whether it has really been looked at with any care by the Department of Defense or by your organization, but if somebody gave you an arms control possibility of having a straight swap of Soviet SS-18's versus MX, we get rid of the MX and don't deploy any more, and they get rid of the SS-18's, what would be your reaction to that kind of proposition?

General WELCH. As you said, I would have to think about that a minute, but let me just comment for a second, and that is, in addition to those [deleted] SS-18's with 10 warheads each, they have got [deleted] SS-19's with 6 warheads each. So that if they did away with the SS-18's, we have still got those [deleted] SS-19's to deal with. [Deleted.]

[Deleted.]

Senator **Nunn**. They have got to go [deleted] with that one, don't they?

General **Welch**. So we have got to get a lot more than one for one before any of us are going to be very comfortable about that kind of a tradeoff. We would have to get better than a one for one before any of us would be comfortable with that kind of tradeoff.

Senator **Nunn**. What do you mean better than one for one?

General **Welch**. One SS-18 for one Peacekeeper.

Senator **Nunn**. I mean the force. It would be better than one for one.

General **Welch**. They would give [deleted] we would give up 100, we still have nothing that is capable against the SS-19's.

Senator **Nunn**. But you have so reduced the threat on them, I mean, we wouldn't want to become so obsessed with what we can do to them that they don't think what they can do to us.

General **Welch**. Like I said, I think I need to think about that some more, Senator.

Senator **Nunn**. I would, too. I don't know what my final reaction would be either.

General **Welch**. We have been offered some arms control proposals. I have never been offered that one.

Senator **Nunn**. Thank you, Mr. Chairman.

Senator **Warner**. Senator Levin?

Senator **Levin**. Thank you, Mr. Chairman.

A couple of years ago Richard Perle was in front of the committee and we were talking about the triad, and the strengths and weaknesses of the triad, and he went through some of our strengths, some of our weaknesses relative to the Soviets, and I ended up by asking him overall, would you swap the triad? His answer was no.

What is your answer?

General **Welch**. My answer as of this moment is no, I wouldn't swap triads. [Deleted.]

Senator **Levin**. So would he, so would I. The question was overall whether he would swap. I gather you agree with him on that.

Now, General Davis I guess just last year was asked the following question by me relative to SALT II limitations, and I would like to know whether you would agree with him on his answer. I asked whether or not he would recommend to the President that it is in our interest to abide by the SALT II limitations, and his answer was that he has made the assessment privately today that we should continue to abide by the SALT II limitations.

I am wondering whether you have made an assessment on that.

General **Welch**. It is my opinion that as of this moment we have a net gain from abiding by SALT II. I think we have to continue to re-examine it to ensure that we continue to have a net gain, but my current assessment is that there is a net gain in abiding by SALT II as of this moment.

Senator **Levin**. Is it your intention now when you submit those new silo configurations for the MX, the second 50 MX that you are hoping to get, that those new silos would comply with SALT II limitations?

General Welch. The opinion of the folks in that community, and I would defer to them, is that the proposals that we are currently considering do comply with SALT II.

Senator Levin. So it is at least your present intention that whatever proposal you give us with the 1988 budget would be a proposal that complies with SALT II in that regard?

General Welch. We are getting into an esoteric area where my expertise gets very thin, and as I said, I would rely on the advice of those people in that business who tell me at this point in time that the proposals that we are currently considering do comply with SALT II, and one of those is the superhard silo. And it is their opinion that the superhard silo does comply with SALT II.

Senator Levin. Do you concur?

I think you have answered that question. I would rather leave the record right where it is since it is a good record from my perspective.

General Welch. I should also add, though, that when it is no longer to our advantage to comply with SALT II, I would no longer recommend complying with SALT II since we never signed it, and it has long since expired.

Senator Levin. But as of today?

General Welch. As of today I don't see that situation.

Senator Levin. And you recommend continuing compliance as of today.

OK.

Now, on the question, back to that chart we had some discussion about today, I am wondering what percentage of Soviet strategic targets you think we must be able to wipe out in order to have a high confidence deterrent.

General Welch. Of course, I don't determine that. That is determined by the JCS in conjunction with advice from DIA and CIA. So that is not my determination to make. I am simply given a target set and told what the judgment is as to the damage against that target set.

Senator Levin. Maybe I misunderstood your testimony. I thought you said that in 1991, under certain assumptions, we would be bumping up to that [deleted] against there.

General Welch. We are bumping up to the criteria that I have been given.

Senator Levin. And that you would consider that to be high level deterrence at that point.

My question is that was about [deleted] percent or so? That was your judgment, I think, not the JCS's judgment that that would be high level deterrence.

Would [deleted] be high level deterrence? What do we have to get to before we have the high level of deterrence, high level deterrence you were referring to?

General Welch. Your question is, How far below that line could we get and still be comfortable?

Senator Levin. And still have that high confidence deterrence, as you phrased it, I believe.

General Welch. The definition of high confidence deterrence is that you reach the damage criteria line. Anything below the damage criteria line, then your confidence begins to erode.

The answer as to how far you can go below that and still be comfortable I have to leave to you.

Senator LEVIN. How about you? Where are you comfortable, 10 percent below?

General WELCH. I would certainly be comfortable with 10 percent below. I certainly would settle for 10 percent below.

You need to understand what is in that line. There are thousands of targets that are not in there. Of the thousands and thousands of targets that are eligible that could be useful, there is a very restricted set in that that we address in the damage criteria. You may be interested to know that [deleted].

Senator LEVIN. You answered Senator Nunn a few moments ago that we assume that [deleted] of the Soviet silos would still have missiles in them at the point that our retaliation would hit.

Is it their policy not to launch on warning if they saw a retaliatory strike?

General WELCH. They might well do that. The whole point of this, though, is that we are talking about the deterrent equation, not the war-fighting strategy, and my point was that if we have in our hands the capability to retaliate with a responsive attack against that target set, then the Soviet decisionmaker knows that he cannot preserve that capability that he intended to preserve to meet his war objectives.

So indeed, I can't give you a judgment about whether or not those missiles would actually be there. I can give you a judgment that if he knows that we can deny him his use of those weapons for their intended purpose, then he is deterred from using those weapons in the first instance.

Now, once deterrence fails and we get into warfighting strategy, I don't think any of us can predict what the scenario would be.

Senator LEVIN. I think that was Senator Nunn's question, whether if deterrence failed, whether those weapons would be in the silos. Your answer was that [deleted] of them would be there, and I was wondering if you know it is their policy not to launch on warning?

General WELCH. No; I don't know that that is their policy at all. I don't know that that is not their policy. We do know that they can cover the targets that they need to cover with those weapons, with about [deleted] of them. So you can assume from that that as warfighting strategy, we would prefer to hold the remaining in reserve for another purpose.

I do not at all believe that he has a policy of not launching on warning.

Senator LEVIN. Thank you. My time is up.

Senator WARNER. Thank you, Mr. Levin.

I wonder if you might wish to consult with some of your colleagues here and perhaps add something in the record about the question Mr. Levin put with respect to the hardened silos and SALT II. We received testimony from the Department of the Air Force that might well be in conflict with yours.

Does anyone want to talk with the General a minute on that point?

General McCarthy. In the deceptive modes where it is a mobile system, it is consistent, to my knowledge. There are a lot of postulated systems for that, but those that are under consideration.

General Welch. I think the proper answer to that, Senator, is that we have stepped into an area that we don't know very much about.

Senator Warner. May I suggest that you give that a little priority attention, and for the purposes of the record we will indicate that the general wishes to review that question.

Is that agreeable, Mr. Levin?

Senator Levin. If the General wants to review the answer, I have got absolutely no problem in reviewing that answer at all.

Senator Warner. In light of the testimony received by the subcommittee.

Senator Levin. It is indeed different testimony than we received just a few days ago, and I think it is important that you know what that testimony is, because your position is that at this time we should not undermine or undercut SALT II, and I think it is important to know that.

And if you want to supplement your testimony in some way, I have no problem with your doing that at all.

General Welch. I would appreciate the opportunity, sir.

Senator Warner. That opportunity is granted.

Senator Levin. I will have some more questions for the record anyway.

Senator Warner. I just wouldn't want this response to begin to circulate in our thinking process until such time.

You have been an absolutely superb witness. I have received comments from my colleagues as I have had to go in and out of here about how impressed we are with you as an individual and your professional grasp of the issues that are in your command.

To follow up on Senator Levin's question, how can we flight test a small ICBM if we continue to comply with SALT II?

General Welch. Of course, I think the answer to that is that by the time we reach that point in time, we will clearly have to make that decision of whether or not it continues to be in our interest to comply with SALT II. I needn't detail the fact that the Soviet deployment of the SS-25 is already in violation of SALT II, because I have already said it is in our interest as of this moment to continue to comply. I am not at all sure when it comes time to test a small ICBM that I would give you that same answer.

Senator Warner. General, we will be presenting questions for the record to you very shortly to supplement what we have propounded today.

We again thank you and members of your staff and others who joined us today for a very important and informative hearing.

General Welsh. I thank you very much, Mr. Chairman.

Senator Warner. We wish you luck, but there is a certain reservation on behalf of many of us here. We hope that you stay where you are.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN W. WARNER

SRAM REQUIREMENTS

Senator **WARNER**. General Welch, in targeting heavily defened targets, what value do you attach to the supersonic speed of a SRAM replacement in contrast to performing the same mission with a slower, very low RCS missle?

General **WELCH**. [Deleted.] The synergism associated with employment of both SRAMS and cruise missiles results in a capability to place more weapons on target.

MINUTEMAN III PENETRATION AIDS

Senator **WARNER**. General Welch, the committee notes that the FY 1987 budget request includes starting full scale development of a penetration aid for the Minuteman III. What is the military rationale for this initiative?

General **WELCH**. Improved penetration aids are required in order to ensure [deleted].

MOBILE MISSILE BAN

Senator **WARNER**. General Welch, from the military perspective, what is your assessment of a ban on mobile ICBM's?

General **WELCH**. Strategic forces comprised of several components and basing modes permit each to function as a hedge against possible Soviet successes in endangering any of the others. Land-mobile ballistic missiles reinforce this concept, adding enduring survivability for a significant part of the ICBM force.

However, the momentum in mobile ICBMs, at the moment, heavily favors the Soviets. They have deployed the road-mobile SS-25 and are testing the SS-X-24 rail-mobile ICBM. Soviet momentum in mobile ICBMs is aimed at reducing their offensive forces' vulnerability to a U.S. retaliatory response. [Deleted.]

SHORT FALLS

Senator **WARNER**. General Welch, in your role as Director of the Joint Strategic Targeting Planning Staff (JSTPS), what is your primary shortfall today in meeting requirements, and what will be your shortfall in the mid-to-late 1990s?

General **WELCH**. The greatest and most destabilizing shortfall in our nuclear force structure today is in capability to hold at risk hardened Soviet ICBM sites and command centers. This shortfall in prompt, hard-target capability is particularly significant since some 75 percent of Soviet nuclear force structure resides in their ICBMs. This situation is highly destabilizing and requires first priority attention. We must convince the Soviets that we have the forces necessary to promptly disrupt a nuclear attack and preclude succesful follow-on attacks. The only near-term solution to this shortfall lies in the capability resident in a full complement of Peacekeeper missiles augmented in the future with deployment of the Trident D-5 and Small ICBM.

Along with the forces, we need to continue planned programs to provide robust C^3I for warning, attack assessment and connectivity from the NCA to the forces.

1500 ALCM LIMIT

Senator **WARNER**. General Welch, what are the implications for long term bomber force stucture should the Soviets agree to the U.S. suggestion of a 1500 air launched cruise missile limit?

General **WELCH**. While arms control proposals are a factor, the evolving Soviet target structure requires that we build a flexible, fully modernized bomber force. Sequential deployment of the B-1B and the ATB achieves this objective. [Deleted.] If cruise missiles are numerically limited, they should be the most capable available to insure the maximum benefit from the reduced numbers. [Deleted.]

QUESTIONS SUBMITTED BY SENATOR STROM THURMOND

DEVELOPMENT OF EARTH PENETRATING WEAPONS

Senator **THURMOND**. General Welch, given intelligence estimates of deeply buried Soviet leadership facilities, do you believe that the U.S. should pursue development of earth penetrating warheads (EPW)? Does the 37-40,000 pound weight limit for a small ICBM provide for an EPW option?

General **WELCH**. [Deleted.]

COMMAND CONTROL PRIORITIES

Senator **Thurmond**. General Welch, do you attach higher priority to the completion of near-term command, control, and communications improvements (such as GWEN and Mobile Receive Terminals) or to longer-term improvements (such as MILSTAR) in the event that budget constraints preclude full support of both?

General **Welch**. Because both are important, SAC has developed a well-balanced command control architecture that supports strategic forces now and in the future. The near-term systems are essential to insure continued connectivity between/from the NCA to the forces. These improvements, such as GWEN and the Miniature Receive Terminals, correct current deficiencies in the ability to connect to the bombers and missiles. Other near-term command control upgrades that fall into the same category are Superhigh Frequency (SHF) satellite terminals for Missile Launch Control Centers and communication improvements to the Worldwide Airborne Command Post. These near-term programs are being deployed and must be kept on track. For the longer term, MILSTAR and a survivable endurable command control capability to support future force management throughout the spectrum of conflict are required to provide the C^3 to properly use the flexible response capabilities of the forces. MILSTAR, in particular, is a key initiative in the President's strategic modernization effort to strengthen critical communications for both strategic and tactical operations.

MINUTEMAN III REPLACEMENT OF MINUTEMAN II

Senator **Thurmond**. General Welch, would you recommend the deployment of 50 Minuteman III missiles to replace Minuteman II missiles as a response to Soviet arms control treaty violations?

General **Welch**. If we were directed to make an appropriate and proportionate response that would deny the Soviets military benefits for their violations of arms agreements, then the replacement of 50 Minuteman II missiles with 50 Minuteman III assets become a viable alternative. Additionally, since Minuteman II test assets are scarce, the replaced missiles would add to the test program to help ensure continued weapon system reliability.

Questions Submitted by Senator John Glenn

BOMBER FORCE MIX

Senator **Glenn**. What is SAC's recommendation for the most effective aircraft mix through the year 2000?

General **Welch**. My recommendation in 96 B-52Hs, 100 B-1Bs, with ATBs to fill the remainder of the force. The result of the congressionally mandated bomber study provide a comprehensive answer to the question of an effective bomber force mix through the year 2000. The study should be available in the near future.

ADVANCED CRUISE MISSILE ASSESSMENT

Senator **Glenn**. In your statement you indicate that the ATB will "greatly stress Soviet defenses and force continuing Soviet expenditures on improved defenses."

In other testimony, I have been told that the Advanced Cruise Missile will pose an even greater threat to Soviet Air Defenses.

What is your assessment?

General **Welch**. The ATB and the Advanced Cruise Missile (ACM) are complementary in that both exploit Stealth technology. The ATB provides the full flexibility of the manned bomber while the ACM provides the most effective standoff capability. Both are essential for future high confidence deterrence.

ATB CAPABILITIES

Senator **Glenn**. You also indicate in your statement that the ATB is the most promising weapons system to counter the "relocatable target." By that I assume you mean mobile targets such as the SS-25 and the SS-24.

Operationally speaking, what do you envision—a type of armed reconnaissance mission with the ATB seeking out and destroying mobile targets with nuclear weapons?

Once the Advanced Cruise Missile becomes operational, what will our requirements be for a deep penetrating bomber except for the possible exception of vital mobile targets?

General **Welch**. [Deleted.] Other than its RT capability, the penetrating bomber can readily perform the essential task of real-time target damage assessment, react to both known and unanticipated air defenses, and provide follow-on coverage to achieve required damage levels. In addition, the penetrating bomber provides a versatile conventional capability. As the technology embodied in Soviet air defense systems continues to move into various countries around the world, the penetrating bombers becomes more crucial in meeting the growing demands of theater commanders. Finally, the Soviets have great respect for the capability of a bomber force, as reflected in their own development efforts and the considerable resources they invest in providing a defense against the penetrating bomber.

B-1B PENETRATION CAPABILITIES

Senator **Glenn**. There was considerable testimony in the 1981 bomber hearings that the B-1 would be an effective penetrator well into the 1990's. Is this still a correct assessment?

General **Welch**. Yes. The B-1B will continue to be an effective penetrator well into the 1990s. The B-1B is designed with the capability [deleted.] In combination, these capabilities, will provide effectiveness against an increased threat into the 1990s.

B-1B UPGRADES

Senator **Glenn**. Have any upgrades been considered for the B-1B?

General **Welch**. Yes. There are some near-term capability growth requirements that will enhance operational flexibility. [Deleted.] Such modifications are a natural outgrowth of the evolving threat and U.S. technology.

TECHNOLOGY AND COST RISKS OF ATB

Senator **Glenn**. How would the Air Force describe the technology and cost risks of ATB?

General **Welch**. The ATB development program is progressing well, and the technologies are well understood. We agree with Secretary Weinberger that the ATB can be procured within projected cost and we fully support the estimate of total ATB program cost provided to the Congress on January 31, 1986.

PROGRAM ON SCHEDULE

Senator **Glenn**. Is the ATB development program on schedule?

General **Welch**. Yes. The ATB development program is progressing well, and the schedule has not slipped. We are committed to maintaining the planned schedule that achieves an initial operational capability in the early 1990's.

Senator **Glenn**. How much concurrency is there in the development program?

General **Welch**. The specific details regarding schedule of the ATB development program are classified SAR. Procedures have been established to provide this information through the committee staff. However, we can say that we are on schedule to support an IOC in the early 1990's.

DEVELOPMENT AND TESTING

Senator **Glenn**. Will there be sufficient development and operational testing before major production is recommended?

General **Welch**. The specific details regarding development and testing schedules of the ATB program are classified SAR. Procedures have been established to provide this information through the committee staff. However, the ATB program remains on its original schedule which will support an early 1990's IOC.

Senator **Glenn**. Will the ATB have a full multimission capability—penetrator—missile carrier—conventional?

General **Welch**. The superior survivability of the ATB based on its unique low observable characteristics, combined with its payload and range capabilities, substantially increases its military effectiveness over that of the B-1B. Of particular importance is the fact that the ATB's capability is based on a very robust technology that will allow it to penetrate advanced Soviet defenses and ensure its effectiveness well into the 21st century.

Senator **Glenn**. Will the ATB have an ECM capability?

General **Welch**. In terms of mission capability, the ATB's unique low observable characteristics make it far more survivable that the B-1B. Of particular importance is the fact that the ATB's capability is based on a very robust technology that will allow it to penetrate advanced Soviet defenses well into the 21st century. Further details regarding ATB capability are classified SAR. Procedures have been established to provide this information through the committee staff.

Senator **Glenn**. Would buying more B-1's or even keeping an option for buying more be a worthwhile hedge against risks in the ATB program?

General **Welch**. No. We are confident that the President's two-bomber program of 100 B-1B's followed by the ATB development to support an early 1990's IOC is the most effective and efficient use of our resources to modernize our strategic bomber force.

Senator **Glenn**. Would building more B-1's put worthwhile competitive pressure on ATB program?

General **Welch**. No. The Air Force has neither planned nor budgeted for more than 100 B-1B's. We are confident that the President's two-bomber program of 100 B-1B's followed by the ATB deployment in the early 1990's is the most effective and efficient use of our resources to modernize our strategic bomber force.

Senator **Glenn**. Does the bomber study investigate the cost effectiveness of different mixes of B-1, ATB and B-52 aircraft? Were different combinations of B-1 and ATB looked at to access the cost effectiveness of future modernization?

General **Welch**. Yes. The bomber study did evaluate alternative bomber forces and it does provide a comprehensive answer to the question of an effective bomber force mix through the year 2000.

Senator **Glenn**. How were the bomber study cost comparisions made? Did the study use the marginal cost of the B-1—that is the cost of the 101st aircraft—in the comparisons?

General **Welch**. It is my understanding that the bomber study cost comparisions are based on the number of additional B-1B's required to deliver an equal number of arriving weapons as the currently planned ATB force.

[Whereupon, at 4:25 p.m., the subcommittee recessed subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

TUESDAY, MARCH 25, 1986

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

SDI POLICY AND PROGRAM ISSUES

The subcommittee met, in open session pursuant to notice, at 9:08 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Thurmond, Quayle, Wilson, Nunn, Stennis, Hart, Exon, Levin, and Kennedy.

Staff present: Arnold L. Punaro, staff director for the minority; Patrick A. Tucker, general counsel; Jeffrey H. Smith, minority counsel; Robert G. Bell, Robert F. Bott, Douglas R. Graham, William E. Hoehn, Jr., and Gordon G. Riggle, professional staff members; Colleen M. Getz and Russell C. Miller, research assistants; Karen A. Love, staff assistant.

Also present: Henry D. Sokolski, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Allan W. Cameron, assistant to Senator Denton; Janne E. Nolan, assistant to Senator Hart; Jeffrey B. Subko, assistant to Senator Exon; John B. Keeley, assistant to Senator Levin; and Thomas K. Longstreth, assistant to Senator Kennedy.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. The subcommittee convenes in open session this morning to receive testimony from administration witnesses on the policy and programmatic issues associated with the President's Strategic Defense Initiative [SDI] Program. This is the subcommittee's fourth hearing in connection with the markup of S. 2199, the fiscal year 1987 defense authorization bill.

Last Sunday was the third anniversary of President Reagan's historic March 23, 1983, speech that launched our Nation on this important initiative. In the last 3 years, despite congressional funding reductions that have increased program risk, significant progress has been made in determining the feasibility of key strategic defense technologies.

In addition, a great deal of attention has been paid to the important question of how strategic defenses would support and strengthen our deterrent strategy.

While we can look back over the last several years with satisfaction, a number of important questions remain. Among these are:

In addition to its focus on comprehensive defenses, is adequate emphasis within the SDI Program being given to the development of defenses for our allies?

Has the SDI Program prepared options for the early deployment of strategic defenses in response to changes in the threat, like a Soviet "creep-out" of the ABM Treaty or increases in Soviet offensive forces?

The subcommittee looks to this morning's hearing to shed light on some of these issues.

Our witnesses this morning are Mr. Richard Perle, the Assistant Secretary of Defense for International Security Policy, and Lt. Gen. James Abrahamson, the Director of the Strategic Defense Initiative Organization. Both of our witnesses are familiar to this subcommittee. I welcome you again this morning.

Senator Nunn, do you have some remarks this morning?

Senator **Nunn**. No, Mr. Chairman.

Senator **Warner**. Senator Stennis.

Senator **Stennis**. No, thank you. I am just glad to be here.

Senator **Warner**. Senator Kennedy.

Senator **Kennedy**. No; thank you very much.

Senator **Warner**. Senator Thurmond wishes his opening statement to be inserted for the record.

[The prepared statement of Senator Thurmond follows:]

Statement by Senator Strom Thurmond

Mr. Chairman. It is pleasure to join you here today to receive testimony on the President's Strategic Defense Initiative, and I would like to add my welcome to Secretary Perle and General Abrahamson. Gentlemen, you have both been here many times before, but it is always beneficial to hear your views on SDI.

Mr. Chairman, I would like to add that you did an excellent job last night on ABC's "Nightline" program responding to questions about Libyan attacks on the U.S. fleet operating in the vicinity of the Gulf of Sidra.

Mr. Chairman, my major concern with the Strategic Defense Initiative is linked to the issue of the small mobile ICBM. The small mobile ICBM will be very costly, and I fear that as defense budgets get tighter the Strategic Initiative may suffer. I hope that our witnesses today will address the priority of SDI in our defense planning.

Thank you, Mr. Chairman.

Senator **Warner**. General Abrahamson, would you like to lead off?

Mr. Perle, do you have any time constraints this morning?

Mr. **Perle**. No, sir; I can stay as long as the subcommittee can bear it.

Senator **Warner**. General, you may proceed.

STATEMENT OF LT. GEN. JAMES A. ABRAHAMSON, U.S. AIR FORCE, DIRECTOR, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

General **Abrahamson**. Sir, I have a written statement which I would like to submit for the record if that is your pleasure. It does deal with going back again and reiterating both the objectives of the program, some of the progress, and some of the issues associated with the program.

I will submit that for the record if that is acceptable to you.

Senator **Warner**. Please proceed.

General **Abrahamson**. Of course, it is a pleasure to be back and to describe some of the programs that we are making, and also to attempt to try to put the program itself and the scope of this tremendous research effort into some structure so that people can have a better understanding of it. I think we are always struggling for that.

One of the reasons that it is difficult to enforce is because some of the conflicting views of what should be the final objectives.

Additionally, just the scope of the program is so broad and some of the research is so dynamic, the progress in certain areas lends itself to a moving program where we are emphasizing some technologies over others. I would like to try to bring that out, if I may and try to amplify the true objectives and what I believe will be the final decision point which is so important for the Congress as well as the administration.

Perhaps the best way to do that is through a visual presentation which I brought with me today. I would like to show just a few models to illustrate some of the technology, primarily emphasizing some of the nonlasers, some of the more conventional kinds of technology. This is an area of interest and an area of questioning that I know, and which you mentioned in your opening statement, will be important.

We have spent so much time describing directed energy and other laser technologies that it might be worthwhile to understand the underlying pace and the objectives in some of the more conventional technologies as well.

Senator **Warner**. All right. You may proceed.

General **Abrahamson**. May we have the charts, please? [Chart presentation.]

First of all, as a reminder, I would like to restate the terms of the SDIO's objective, and direction given by the President. The first point is that the SDI is a research program designed to develop key technologies for defense against ballistic missiles of all ranges for the United States and our allies.

The early Fletcher study dealt with the short-range problem, but put most of its emphasis on what had been considered the unsolvable problem to that point in time and, therefore, we had a better road map in some of the technology areas aimed at the long-range problem.

Nonetheless, we have been working and continue to work on the short-range problem as well. I will come back to that.

Of course, what we are looking at is how a strategic defense initiative fits with the context of our overall forces, both our conventional forces and our nuclear retaliatory forces. We hope to begin working toward a positive decision in the program to go into engineering and deployment. We would like to be able to swing the pendulum from an exclusive reliance on retaliatory measures to one that increasingly moves toward a defensive component.

Regardless of some of the assertions that have been made, you do not necessarily pass through a period of instability and danger.

We think that some of the war games, some of the political-military strategy games and certainly the analytical thinking, the deep analytical thinking that has been done, in fact, justify the position that the transition phase is not a period where you are increasing danger. In fact, for every increment of credible defense that we can add coupled with a strategy of arms reduction in the offensive nuclear forces, you are introducing more stability, particularly in a crisis situation.

The objective of the program, and again here is where people are often confused, the only approved program is the research program, the objective of the program is to provide sufficient information so that a reasonable technical and affordable judgment can be made at some time in the future. That judgment would be the one that allows you to move forward from a research program into a more traditional development program, emphasizing the specific technologies and the specific systems that would be required to then later deploy an effective ballistic missile defense system.

Now, it is imperative that there be a research program. If we are going to build a new airplane—in fact, when I started on the F-16 in the very early days of that development program, I had to rely on all of the solid technical work that had been done on all of our fighter planes before that period of time.

We had developed engines, in fact, we used an existing engine and improved it slightly. We had developed all the different versions of electronics. We had a broad body of aerodynamic data and computer programs as well as wind tunnel tests that allow us to make those modifications.

The base technology would, and did, allow us to proceed with reasonable confidence, both in the achievability and in the effectiveness and certainly in the cost of these programs like a fighter plane.

The same concept applies with many of our other conventional forces. However, there was not the kind of history and background to work from what we had for the F-16. However, there were a few pioneers who have been doing important research in directed energy concepts in spite of the law funding and its lack of popularity especially in the period after the signing of the ABM Treaty. The problem was that a broad solid base of data was not available to provide you—by "you," I mean the administration, certainly the military people who are responsible for the management of these programs and the Congress—some reasonable confidence to go ahead. That is why a research phase is so important.

By the way, because that body of data does not exist also means that some of the questions that people ask and expect to receive reasonable answers to are presently unanswerable.

For the SDI, those answers to questions about cost are not available yet and that is why I have continually said that I cannot give you a responsible answer on what the cost of one of these systems might turn out to be until after we have proceeded far enough into the research program to determine the technical feasibility and cost effectiveness of proposed systems.

Therefore, while those are all good and proper questions, you have a right to be impatient for some of these answers, all I can say is that I cannot give you responsible answers at this time.

By the same token, some of the critics who blithely throw out answers that any SDI system will be in the trillion dollar range, are not being responsible as well. Estimates like that are based on a series of assumptions, of cost, and various parametric equations that we often use today. They are not based on the results of where we think the research program will go.

I will try to show you some examples of that and why I think this is so important.

I do have a responsibility to try to protect an option for near-term deployment of a limited ABM capability. Obviously, that would be a highly desirable and useful thing if that were available now, particularly in view of some of the trends that we see in the Soviet research, in the Soviet operational developments in the SA-12, and many of the other things that are now updated and laid out in this latest verson of Soviet military power which is releasable this morning at 9 o'clock.

Rather than go into the detail of all those threats, we have presented those, both in closed and unclassified hearings before congressional committees, as well as in earlier versions of Soviet military power. I believe we have outlined some updated information and tried to organize it in a way that is as acceptable as possible.

We have some extra copies of this, too, for the subcommittee this morning so that that is available.

Now, that limited near-term option. I believe that while we are working on it and while we are putting money in it trying to emphasize some of the systems, the long pole in that tent, just as the long pole in a more robust option, is an effective surveillance data handling and command and control section.

Therefore, to put just an unlimited amount of money in the weapons for that system when the control and when the time sequencing is determined by the command and control problem, I think would be an unbalanced program.

Therefore, as we gain understanding through our system studies of what the best and most reasonable technical option is, as well as the military option, for a near-term response and while we are trying to put an appropriate and prudent amount of investment in that area, we do know that the schedule is controlled primarily by this command and control issue. Therefore, that is a factor in how much we are doing that.

We are trying to make a balanced program and invest partially in near-term options, partially in later options and partially something that would enable us at some time in the future, perhaps some considerable time in the future, to have the technology to build up the very robust defense that the President has outlined and has given us as a challenge, one that can be an effective defense for the Nation as a whole and for our allies, for our people as well as our strategic weapons.

We are emphasizing nonnuclear kill mechanisms. Therefore, it seems a paradox, particularly in some of the newspaper articles, that we are advocating and conducting a program of nuclear testing that is part of the strategic defense initiative. It is a small part of the program.

In fiscal year 1986 if you look at the funds that the Department of Energy has laid out for that nuclear test program and compare that to the total in the Department of Energy and in the Department of Defense, it is less than 10 percent of the total program.

Now, that does build and become slightly higher in our fiscal year 1987 request. The rationale for that is the same rationale that we use as we proceed with some of the technology in the Department of Defense program alone.

Let me show you by analogy what I mean. [Demonstrating to models.]

We are emphasizing speed of light weapons—lasers. We are doing a lot of research into lasers. We think that may well be the new age and the new concept of weapon systems that will make boost phase defense very, very effective.

But at the same time that we are emphasizing lasers, we are also trying to invent laser armor. We are also trying to assess the implications that if we can invent it, the Soviets probably can invent it, too. Maybe not as quickly as we can, but we feel they can eventually. Maybe they can steal it. Who knows?

But somehow they can invent that kind of armor. So, we need to be able to understand what the implications are if they can invent that armor and if they can apply it simply and easily to their boosters, because if they could, then the selection of a laser to destroy one of those boosters may well be the wrong selection and a very expensive mistake.

Therefore, our research involves in-depth efforts, both in the weapons one might use and the system one might use for defense. It is imperative that we understand what it is that the other side might do, not just using short-term intelligence to project that, but trying to search for the areas of fundamental physics advantages or fundamental economic or engineering advantages for defense. Regardless of some of the blithe assertions, again, by some of the critics, that could provide them with a real defensive advantage.

Now, how does that apply then to nuclear energy? We are entering an age, whether we like it or not, whether we would like to just stop it or not, where there is a third generation of nuclear weapons that are being invented. They are being invented both in the Soviet Union and in this country.

Those are weapons where the nuclear explosion is not intended to be the destructive force. The nuclear explosion would occur in space, by the way, where it cannot damage anything or injure anyone on Earth, but what happens is that the nuclear explosion becomes the pumping mechanism, it becomes the power mechanism that drives something like an x-ray laser. But I would like to point out there are several other smaller and less significant, certainly less controversial, concepts.

Now, this x-ray laser first appeared in the Soviet literature in 1974. It did not appear first in the United States literature. We do not know as much about some of the testing and the results of their testing as we would like, but we do have some sources and we know that several years ago they did have an event that we are not able to be in a position to effectively test for some time.

So, there is at least some indication that there is considerable progress. I have to say that it is not clear at all how fast they are moving in these areas.

Now, theoretically, an x-ray laser could be used in many different ways. There are indications that it could be used against an SDI system. If the x-ray laser could achieve the power levels that are theoretically possible, it would mean that we would have to modify and take a completely different approach to the spaceborne elements of a strategic defensive initiative.

Therefore, it is imperative for us to understand if that technology truly does have the potential that we are talking about. But it is unfortunate that that research in the Department of Energy is tied only to the SDI because I assure you it will have profound effects on many other aspects of Soviet strategy.

If it could be used against an SDI, it could be used in a Soviet SDI system against our present or our future nuclear offensive, defensive, or retaliatory missiles as well. Therefore, that effort of trying to understand what a third generation nuclear system might be is important merely for understanding the threat that we may well be facing or could be faced with some day.

I am not saying that we know that we are faced with it now, but it is a new technology and it is moving ahead. Therefore, it is important, just like we are working on lasers and laser armor, that we work on some of these third generation kinds of weapons and understand what they can do.

SDI PROGRAM OBJECTIVES

Conduct a comprehensive R&D Program to develop key technologies for defense against ballistic missiles.

Consider options to increase the contribution of defenses towards deterrence.

Provide the basis for an informed, full-scale engineering development decision in the early 1990's.

Protect option of a near-term deployment of a limited ABM capability as a possible response to Soviet ABM breakout.

Emphasize non-nuclear kill mechanisms.

Coordinate SDI with other defense programs and support other strategic defense missions.

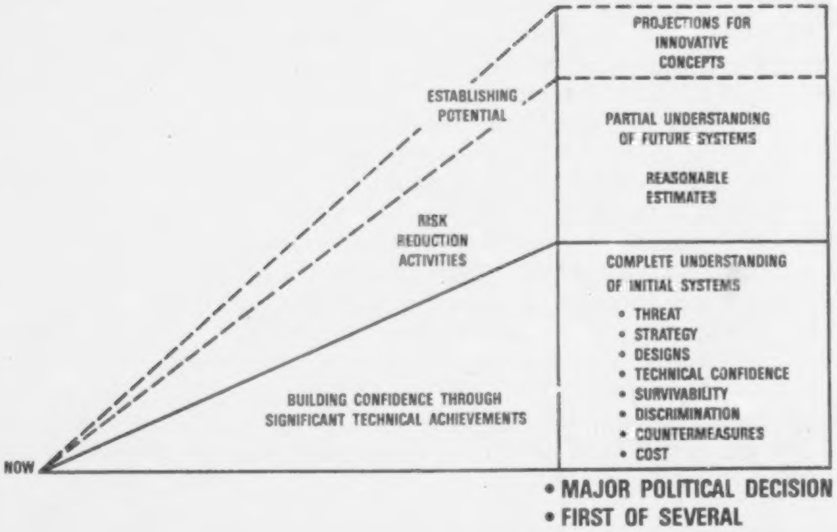
You will notice the large balance here is in the nonnuclear area and in fact the direction is quite clear.

The President has challenged us to emphasize nonnuclear techniques, see it is possible to build something technically feasible and cost effective which can withstand these countermeasures that are nonnuclear, and not to carry out some of this testing and not to generate the understanding of these things is, frankly, burying your head in the sand, and we do not intend to do that in this program.

Finally, the last element here. I have a clear responsibility and we work very hard at doing this to coordinate the technical development that we are researching and that we are pushing for, and you will see some of these examples, to ensure that some of this research is made available to our conventional forces, to our entire security industry so that we can apply this research and gain the benefits in our conventional forces as well, and we work hard trying to do that.

Again, that is the set of objectives and I am sorry to have taken quite so long on this slide, but there were some messages there that I thought were very important.

DEVELOPMENT DECISION CONTENT


PROJECTIONS FOR INNOVATIVE CONCEPTS
ESTABLISHING POTENTIAL
PARTIAL UNDERSTANDING OF FUTURE SYSTEMS
REASONABLE ESTIMATES
RISK REDUCTION ACTIVITIES
COMPLETE UNDERSTANDING OF INITIAL SYSTEMS
• THREAT
• STRATEGY
• DESIGNS
• TECHNICAL CONFIDENCE
• SURVIVABILITY
• DISCRIMINATION
• COUNTERMEASURES
• COST
BUILDING CONFIDENCE THROUGH SIGNIFICANT TECHNICAL ACHIEVEMENTS
NOW
• MAJOR POLITICAL DECISION
• FIRST OF SEVERAL

Now, I indicated that what we are leading to is a decision at the end of a research program. This is going to be the most difficult decision that any of us have ever faced because the decision to proceed will be based on many partial tests.

These tests will include simulations, but they will not be the same kind of tests that support a production decision when a development program ends. You will not be able to see an F-16 fly and bomb and knock out airplanes or knock out drones or do those kinds of things.

What you will see is a simulation. You will see a ground test of a laser that shows you can get enough power there. And you will see tests that show you can project that laser energy up through the atmosphere.

Because of the current direction that we are to conduct this program, within the ABM Treaty, all of us will be faced with a very difficult task of integrating various test information and determining whether the decisions to proceed with the SDI makes sense. At that point the primary concern will be whether we have evidence to determine whether defense is feasible and can go forward.

So, I tried to outline with this chart, primarily down in the lower right-hand corner, what I think that decision might look like and what some of the requirements of a future Congress would reasonably be.

I am sorry that is a little hard to see here.

First of all, out somewhere in the early 1990's we would have to be able to present to you a rather complete understanding of what the initial systems might be; our strategy with those systems and the development requirements right down to the specifications of what we expect from those systems in the development phase of the program.

We will have to show you technical confidence that the components are there so that those could be produced and could be produced reasonably, show you off-line data that it could be survivable, that we understand what threats the Soviets would have now and where they probably would take that threat—they will not stand still, they will move ahead trying to go against whatever system we might put together.

Perhaps most significant of all, we will have to be able to give you a confident assessment of the cost of those systems. We will need to be able to present a reasonable estimate of what the costs in development and what the later costs in production might be.

Therefore, a very significant amount of the research that we are conducting now is aimed at bringing costs down so that it could be an affordable system. In essence, we are doing cost-research. Very often people have chided the Department of Defense for not knowing what the costs are.

I have also heard of development programs where DOD is trying to design to cost. At the SDIO we are going a step further. We are actually researching the costs. I think some of the examples I show you will make that very graphically clear.

That kind of understanding will be necessary to make the decision to go into the engineering and development phase.

You will only achieve that level of understanding by seeing over a period of time a series of partial tests, and war games, simulations. These activities will be building your confidence so that an early 1990's decision, as complex as it will be, will make sense.

Remember, I said that would concern the initial system, the foundation for building the capability for such a system in the future. Behind that you would have to know that if they employed certain countermeasures, you have new technologies that can take it up to that next level of very robust capability, what we are talking about, thoroughly reliable, never perfect.

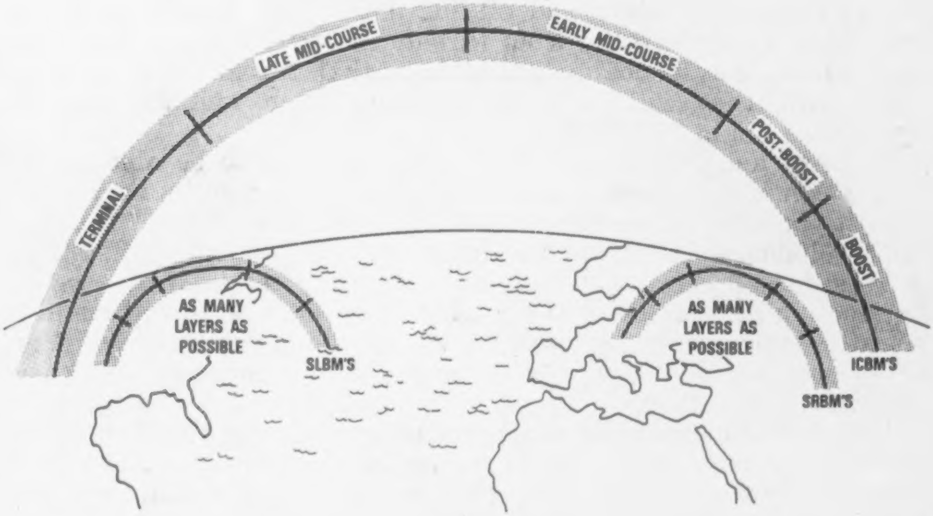
There is no such thing as a perfect or ultimate weapon, but something that will go better. You may not have to have the same confidence in those follow-ons, second generation systems, but you would have to have at least a partial understanding and some confidence that you can get there.

Finally, maybe even at least innovative concepts to bring the cost down further and to be able to counter systems in the future. In short, what we are talking about is a decision that part of it is very carefully and fully understood, but beyond that, you can see a whole branch of technology that can go forward and can continue to make the strategy that we are talking about a viable one.

So, I believe that is the character of the kind of decision that we will be faced with in the nineties.

By the way, we cannot, again, just hide from that. One cannot just say, well, let us not do that, because it is going on in the Soviet Union, the technology is going on, and the question will be how organized will that be, how complete will that be and what level of confidence you will have to make that decision as we go ahead.

GLOBAL LAYERED DEFENSE CAPABILITY



Remember, we are talking about a layered defense. People have often continued to get confused by this layered defense. I will try to simplify it.

We are talking about, at the intercontinental range, as many layers as you can properly get in order to make it difficult for a targeter on the other side to have any confidence that the missile gets through his boost phase, and he would only have a partial ability to know how many he will get through, but he will never know which one, will also be the same one he gets through a post-boost phase through perhaps an earlier and later mid-course in space and then finally in a terminal phase.

We are trying to give him a problem similar to a dice game where he simply does not roll one seven, but he has to have real confidence that he can roll five sevens in a row in order to knock out any one particular target.

If he cannot have confidence that he can destroy one particular target, then he loses his ability to be able to turn to his boss and say, "Yes, I can guarantee you that we can destroy a certain amount or a certain military capability," and, of course that is what we mean by defensive deterrent.

While it is pretty easy to think of that across a 30- to 35-minute flight time and it has one set of techology requirements to build that layered defense for that, we must have an equal level of capability for our allies who rely on our nuclear deterrent strategy, whether it is offensive or a mixture of offense and defense, or whether it becomes more toward the defensive side.

So, we need to be able to have a layered defense in Europe as well and a layered defense in our other theaters.

Now, I frankly think that is a cheaper and simpler job in some respects, but not all, because the time schedule becomes very, very difficult. By the same token, you do not have to reach across the curvature of the Earth over huge distances. So, there are both pluses and minuses for that kind of system.

We are not only talking about Europe. We have the same short time of flight problem for sublaunched ballistic missiles on our own shores. Therefore, we need to be able to develop those same technologies or take the technologies that we are developing and might apply in one way for the ICBM threat and take the same technology and apply it in a different way for the European threat.

So, layered defense is truly the key for stability, particularly in this crisis situation.

THE RESEARCH SPECTRUM

TARGET KILL

- GROUND-BASED LASERS
- SPACE-BASED LASERS
- NEUTRAL PARTICLE BEAM
- GROUND BASED SPACE INTERCEPTOR
- SPACE BASED INTERCEPTORS
- SPACE BASED RAILGUNS

SENSORS

- SPACE-BASED SURVEILLANCE
- AIRBORNE OPTICAL ADJUNCT
- BOOST PHASE SURVEILLANCE
- TERMINAL IMAGING RADAR

BATTLE MANAGEMENT/C^3

- SUPER COMPUTING-BM/C^3 TECHNOLOGY
- ADVANCED MATHEMATICS
- SOFTWARE DEVELOPMENT
- NATIONAL TEST BED

Therefore, there is a research spectrum and I am not going to spend a lot of time on this, but I want to take one and go down in detail so you begin to get a better feeling of what we mean by the kind of research.

There are really three categories of systems that must eventually be developed and we are taking parallel courses because we want to ensure that there is not just one simple means of countering the other side.

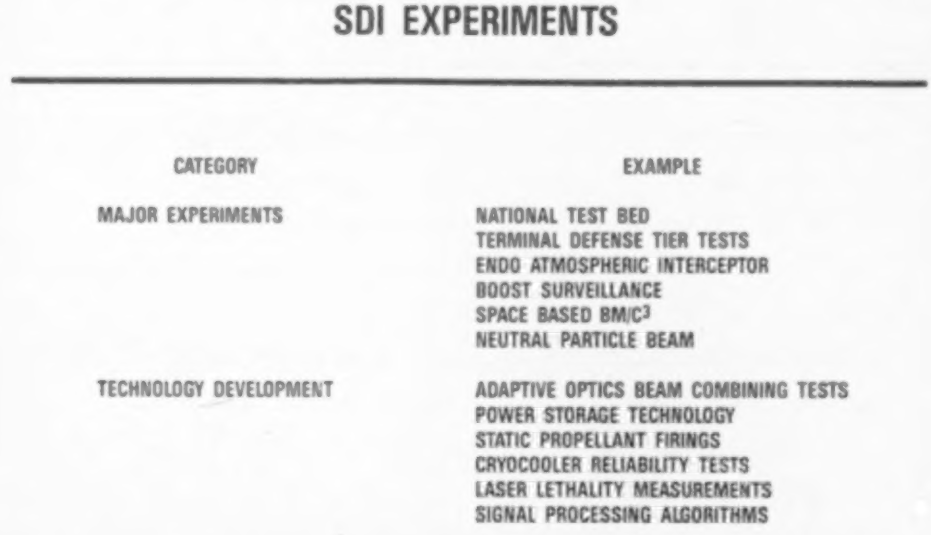
For target kill, and the target is a missile, it is not a city or people on the ground, there are a series of directed energy concepts. You have heard me talk in the past about ground-based lasers or space-based lasers or neutral particle beams.

There are some simpler and more conventional technology systems, a ground-based interceptor, a space-based interceptor, or a space-based rail gun, and I have talked about what those concepts are, but one of those will not be very good unless there are eyes for the system. Sensors in space such as the space-based surveillance system or boost phase surveillance system and some sensors on the ground, such as the airborne optical adjunct or a terminal imaging radar will act as the "eyes" of an SDI system.

The eyes are the key to how the defensive system will work. In the end all of it is tied up by a battle management and C ^{3} system which I believe is the long pole in the tent.

There are some things that we are doing from working on basic concepts of supercomputing all the way now to developing a national test bed which is a ground-based simulation that will hopefully begin to tie all that technology together in a place where you can see and begin to gain confidence in what we are doing.

Let us take that blue one, that space-based interceptor. I would like to try to give you a feel for how we are conducting the research program.



SDI EXPERIMENTS

CATEGORY	EXAMPLE
MAJOR EXPERIMENTS	NATIONAL TEST BED TERMINAL DEFENSE TIER TESTS ENDO ATMOSPHERIC INTERCEPTOR BOOST SURVEILLANCE SPACE BASED BM/C^3 NEUTRAL PARTICLE BEAM
TECHNOLOGY DEVELOPMENT	ADAPTIVE OPTICS BEAM COMBINING TESTS POWER STORAGE TECHNOLOGY STATIC PROPELLANT FIRINGS CRYOCOOLER RELIABILITY TESTS LASER LETHALITY MEASUREMENTS SIGNAL PROCESSING ALGORITHMS

The space-based interceptor is really what I have often called the rocket pod in the sky. Up here in the left is just an artist's concept. It will be a fairly simple space platform. You would want to make it a light-weight space structure.

It would have to have some gross altitude capability so that it can point generally in the right direction, it does not have to be terribly accurate. It certainly has to have communications and telemetry so that it can be controlled properly, so that you can control it with confidence and it has to have survivability features which I would prefer to talk about in an executive session.

Senator NUNN. Mr. Chairman, could I ask one question on the previous chart?

Senator WARNER. Go ahead.

Senator NUNN. General, you have been quoted as saying you are satisfied now that SDI is technically feasible—that may not be an exact quote—in the Defense Daily, and so forth. You have three categories up there.

To what were your remarks addressed? Was it technical feasibility you are satisfied with, the sensors, battle management or a combination?

General **Abrahamson**. That is a very good question. We would develop several of those concepts. I do not want to give a false impression that I think we are here on any of those. I believe we are back here [indicating] on several of those and we can see the course line, we can see the direction.

For example, on the ground-based laser, we now have proven with the free electron laser at the Livermore Laboratory that the free electron laser is a concept that is scaleable to very, very high powers. We have operated an electron and ion source that is big enough and effective enough to prove this.

We have not put it all together yet, we still are back here. But just like you know an airplane is feasible because you flew an F-15 earlier.

Senator **Nunn**. You are talking about all bark and kill. You are not talking about sensors and battle management as being technically feasible, are you?

General **Abrahamson**. I believe that is possible, although I believe there are some problems there.

We have a direction laid out and that direction is giving us great confidence. I will show you some examples of that, if I might.

If I could put it just as accurately as possible, unlike the people who clearly know so much that they can say it is impossible to get there now, I believe we have enough understanding of the basic technology and the way to go and enough confidence that some of those will work out, that we do feel that we can technically achieve the levels of performance that are required for a system in the future.

That does not mean that we are there. We still have to go down that trail to prove it.

Senator **Nunn**. There are two criteria that Paul Nitze said we had to get to, technically feasible and cost effective. You have announced it is technically feasible.

You are talking about way back there on the yellow line where we have not even gotten to these things.

General **Abrahamson**. We have not demonstrated that, but we have a lot of confidence that we can do several of these things and in the terms of the parallel programs that we have, that we have enough redundancy that we can get there with one another.

Senator **Nunn**. Would the word "hopeful" be better to say at this stage rather than to say technically feasible?

General **Abrahamson**. I think we are further than hopeful. It is wrong if I am giving the impression that we are there with technical feasibility. We still have to go down the path.

We have conquered some of the basic physics questions. Now it is a question of moving ahead and providing the kind of engineering.

Senator **Nunn**. Thank you, Mr. Chairman.

Senator **Warner**. While you have that chart up there, at what point on that chart does the ABM Treaty get into the program?

General **Abrahamson**. That is why I say really that would not be a single decision for a whole deployment. I think we would probably use a similar system of DSARC's and specific decisions in the Congress so that there would not be one, there would be several.

But the first go-ahead decision would be the one where the ABM Treaty becomes critical. It is that point in time when you need to address that.

It could also be that there would be some advantages in addressing the ABM Treaty earlier, but the latest reasonable point in time would be at that engineering development go-ahead. I think that is the one with political content.

Senator WARNER. Why don't you pick up where you were?

General ABRAHAMSON. Let us go back to the other chart.

The program is really divided into two kinds of technology development. Some of what we call major experiments, and you can see a list of those, and they are some of the same things I listed on the earlier chart.

Some of them are very small projects which are technology development projects such as how do you store power to be used either in space or on the ground? How do you measure laser lethality or developing signal processing algorithms?

Those are small projects, but they are very vital, they are part of the command and control system, and, by the way, they are the one that are showing us already confidence even in that difficult area and I will give you an example of that.

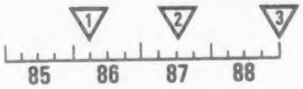
You can see basically it is divided into larger experiments where you begin to see end product, but not total end product, and smaller technology development activity.

EXAMPLES

OF

COSTS FOR RESEARCH PROJECTS

NATIONAL TEST BED

TECHNICAL CONTENT	SCHEDULE (FY)
DEMONSTRATE AND INDEPENDENTLY EVALUATE ALTERNATIVE SDI ARCHITECTURES AND BM/C^3 TECHNOLOGIES USING SIMULATIONS	
COST ELEMENT	**DELIVERABLES**
REQUESTED FY87 (M$) 76	1 CONTRACT FOR NTB PRELIMINARY DESIGN PHASE 2 COMPLETE PRELIMINARY DESIGN PHASE 3 NATIONAL TEST FACILITY CONSTRUCTION COMPLETE

Some of the costs for the research projects, and I will show those in fiscal year 1987, since that is the budget we are talking about, I will pick the large ones, but I will go back to the one in blue, the space-based kill vehicle and go down vertically so that you get a feel for that.

Let me begin with the national test bed [NTB]—I absolutely reject some of the criticism which I think is based on an improper criteria that a command and control system cannot be built. On the other hand, I do believe that it is a very difficult task.

We have started out and we have many different specific projects which are investigating such things as how you do parallel processing, how you do software development for parallel processors—that means a line of computers all working together—and how you can develop the software so that those computers can indeed work together and work together effectively. These are tough problems but have some experts working on them now. Scientists other than SDI are working on equally tasking projects and not being dismayed like Dr. Parnas and some of those who are introducing what I consider to be, again, unrealistic criteria for what has to be developed.

The need for the NTB is evidenced by the fact that our projects are beginning to fractionate. We recognize we are beginning to find the projects in a way that just keeps putting small amounts of money in many places. We needed a place and a function, an activity that would bring all this together so we embarked on another of our horse race procurements. We have now made the first selection of those horse race teams for the national test bed.

Essentially the NTB would be a large simulation on the ground of what a total SDI system would look like. That large simulation, as we build it, will offer us a place to test the command and control elements, test different ideas, trying to make it as simple and as workable as possible, and give us confidence that the approaches that we are using will allow us to have human control where that is required and, in addition, to have the redundancy so that you can have confidence in the automatic features of this system.

So, the national test bed is a very important step.

By the way, that was never laid out in the Fletcher study or in the initial plans. It will be a fairly large and fairly expensive activity, but it will be one of the main ways in which people can see and understand the progress and be able to gain the confidence for a development decision in the future.

In 1987, we are starting with about an $86 million effort. I have said we have embarked on a horse race for NTB. By a horse race I mean we have selected four teams. Those teams will be going as fast as they can to reach their objective. When they reach the first milestone, we will probably cut them down to two, pick the best ones and go forward with those two and at an appropriate point in time we may then cut it down to one.

But the whole intent of this procurement concept is a highly competitive procurement approach. I think you will find, with the exception of where we have had to make use of certain existing contracts, that you have a higher degree of competition in this program than any of recent history and, in fact, some of our contractors are beginning to say they are exhausted making proposals.

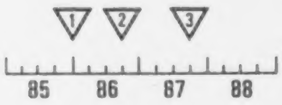
You will see a series of deliverables talked about in terms of design reviews. You will see that we will have earlier simple systems working in the 1988 and 1989 timeframe and that will be expanded and inproved so that it becomes a very, very capable simulation as you get into the early 1990's.

SPACE SURVEILLANCE AND TRACKING EXPERIMENT (SSTS)

TECHNICAL CONTENT

- POST-BOOST AND MID-COURSE ACQUISITION, TRACKING, DISCRIMINATION, AND HANDOFF
- NEAR REAL TIME SPACE BASED CAPABILITY
- SPACE BASED LONG WAVELENGTH INFRARED DETECTION AND TRACKING
- SATELLITE ATTACK WARNING AND VERIFICATION

SCHEDULE (FY)



COST ELEMENT

REQUESTED FY87 (M$) 110

DELIVERABLES

▽1 REQUIREMENT STUDIES COMPLETE

▽2 PRELIMINARY DESIGN REVIEW (EXPERIMENT)

▽3 CRITICAL DESIGN REVIEW (EXPERIMENT)

To make a point about the question Senator Nunn asked earlier about the surveillance systems, here is an example of some of the management actions I had to take because we had to take $1 billion out of the program. It was not easy but we have tried to make reasonable decisions that enable us to maintain the pace of the program.

Usually when I have less money, I tell the people that the only way to save money is to do it faster. That obviously has a limit, but it is not like a production program where you are trying to produce a certain number of a weapons system and if you get less money, you just have to extend that effort.

We are asking the people to be more brilliant and come up with more creative ways. We cannot always do it. In the case of surveillance capabilities, here is an example of what we did.

When we had to take a cut, I divided that program into two pieces. I said that the principal job is data handling and, in addition to that, it has to have very, very effective eyes, infrared heat-seeking eyes or perhaps some other spectra looking out in ultraviolet or looking into visible light spectrum looking at the warhead and the decoys.

Now, we can test the computer part of it on the ground. We do not need to put all of that into space. So, I divided the program into a ground test bed where we can experiment with computers more cheaply and hopefully more quickly and demonstrate that we can do the data handling, keep track of what we see and track what might be thousands, hundreds of thousands even, of objects in space and we can do that more cheaply and more quickly on the ground.

However, you cannot do everything on the ground. You must ensure that the infrared eyes cannot be fooled in space, that they will have the resolution that one requires without glasses, or whatever, some way that you can look and look effectively.

So, we have simplified the space experiment. We are now cut on a very unique procurement for that space experiment encouraging companies to come up with just the very simplest thing possible to show us that the sensors will work and then we will do all of the ground processing, all of the rest of the demonstration on the ground.

Now, we are saving a lot of money and some time and it is the only way that I could absorb part of the cut that we were given last year. Remember, we were given a billion-dollar cut, 25 percent of the overall program.

I can do that once in this program, but I cannot do it twice. I have taken all of the kinds of margin or creative element out, because you must do a demonstration of the computing capability and you must put some of the sensors in space.

Notice by doing that, I have also made the job harder for all of us to understand that we have effectively done it.

Senator HART. General, could I ask a question?

Is there any way to institutionalize skepticism in this whole process?

General ABRAHAMSON. Yes, sir, we have a red team that is an institutionalized skeptical element. We also have a large number of critics everywhere.

Senator HART. Leave them aside. Let us talk about the red team.

General ABRAHAMSON. The red team is one that has several elements and it operates at several levels.

First of all, it operates at a technical level. We have done an in-depth investigation of certain parts of the program, certain parts of the program we have not yet completed.

What it does is it looks at the terminal imaging radar and says you have set up a set of specifications. Now your assumptions are that you are going to be seeing accurately enough that you can, in fact, tell the difference between warheads and decoys at the very last minute and then get an endoatmospheric missile off that will intercept in the atmosphere, but high enough above the ground that it will not do the damage.

We have brought in experts from all over the country who looked at that, criticized what they were doing, and modified the concept for the terminal imaging radar as a result of it.

Senator HART. How would you describe the mandate of the red team? How broad and how far does it go?

General ABRAHAMSON. The mandate is to criticize every piece of the program technically. Now, we can do that and we could drive ourselves to the point that we are just driving the cost absolutely crazy trying to react to things that may be technically feasible but are not probable in terms of their effectiveness.

We are having a little trouble implementing something that we have introduced as a second level. For this level we have named a group of people whose responsibility it is to think Russian, to take the intelligence inputs that we have, look at the history of the way the Soviets respond to systems and say, "is it likely that they would try to do this" or "is it more likely that they would try to do something else"? The participants examine whether the Soviets would try to build a fast-burn booster or space mine or perhaps just proliferate a large number of decoys, and if they did, what would the limits of those be?

That second part of the effort is still being built. It is not as effective yet as I would like it to be. It is a very tough job. Nonetheless, it is there and operating.

Senator HART. Thank you.

SPACE BASED INTERCEPTOR (SBKKV)

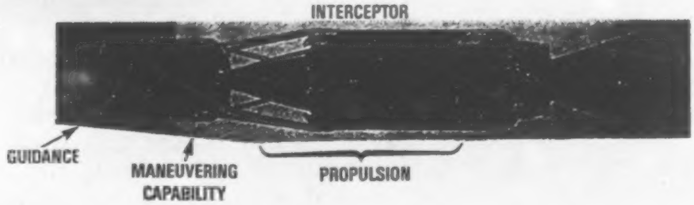
SPACE PLATFORM

LIGHT WEIGHT STRUCTURE

ATTITUDE CONTROL

COMMUNICATIONS/TELEMETRY

SURVIVABILITY FEATURES



General ABRAHAMSON. This one I would like to take as an experiment. This is the rocket pod in the sky. This is the idea of putting a large number of fairly simple missiles in space and those missiles would be able to fire fast enough so that they could cover a very large range and would intercept and destroy a booster.

Now, we have set several specifications and I have described those as somewhere between 5 and 8 kilometers per second as a missile that would have to fire. I have described that the satellite is fairly simple and fairly cheap, but let me spend some time on the interceptor.

That is the picture on the bottom. Remember, the interceptor has to have several elements to it. It has to be able to guide it so that it can operate. It has to have a manueuvering capability and it certainly has to have propulsion.

Now, I would like to show you some specific examples of progress that is being made and how we are doing this component kind of research in order to research the cost.

By the way, when I was responsible for the F-16, we had an inertial navigation set in the F-16 which is a black box about this big, about that high, (a 12″ × 12″) and it has an old rotating ball kind of gyro which becomes the inertial signal for that gyro.

Well, we are already past that. This (demonstrating) is what is called a ring laser gyro. It is only in one dimension. You have to have three of them in order to be effective. But this has now been tried out as the next element of a gyroscope and it has been tried out in an F-15 and could be used on a missile.

Notice the size. It is in production at Honeywell and the production techniques work. Any of you who would like to go up there can see this. It is a fine piece of equipment. It is going into some of our systems today.

However, we consider this to be too expensive. I would like for that interceptor to be very low cost, less than a million dollars. So, our job then is to take each element of that interceptor and to bring the cost of it down. Well, it is coming down.

This (demonstrating) is the next level of a ring laser gyro, and it is about the size of a 50-cent piece. Operating inside of this is a gyro. It is the next generation of technology, the same level of accuracy that the other one has, but much cheaper.

But we are not quite satisfied with this because we still think it is a little too complex, too many parts, a little too difficult.

So, we have on our program, though the group, the technology-supporting activity that is putting together and working on this, come up with a new invention which is what I call the fiber optic gyro.

What you see here is an example of that fiber optic gyro and all it is is a set of coils of fiber optics, a diode type of gyro puts the light through the system. You can see it is getting lighter and simpler as we go.

Now, that is all an attempt "to research to cost" dealing with one element of the guidance system. There are other elements of the guidance system that are just as important, but we are investing in those kinds of component research. But that is not the end-all.

This little thing is the next generation and it is called an ion D concept. If you notice, it has all three elements of the gyro, all three directions. This is called hemispherical, and it is a sound operating, kind of gyro. It will not be terribly expensive to try to exploit this, but you can see the size and difference and simplicity that is associated with this kind of system.

By the way, it is a completely different concept. This was invented by a physicist back in 1890. He was playing with a crystal glass and you know how you play with a crystal glass of wine, or whatever, and you can make it sing. He had it on a lazy susan. He noticed that as he spun the lazy susan, there was a relationship between the position of the glass and the way the sound changed as it went around.

This is a sound version of a gyro, next level. If we can move in this kind of system through these development concepts, it, indeed, does have the real possibility of achieving the kind of costs that we are driving at. We can prove these and we can prove these things separately.

Now, with those kinds of things available to us, then we can eventually put on the front end of this thing a head, a head that can maneuver by itself after it has been accelerated to the propulsion that we want, that will be low cost and, hopefully, not more than two and a half kilograms.

Here is the concept of a head that we can begin to operate on. This is what we mean by "research to cost." I told you that I had final responsibility to take the work that we are doing and to ensure that it can be applied to conventional systems.

I think it is quite clear that all of this kind of gyroscopic research can be applied to missiles of the future, or applied to airplanes of the future, tanks, all kinds of conventional systems. So, it is an example of what I mean by "research to cost" and how we are trying to take what might have been 10 years of development and squeezing it down to 5 years of development going through several generations.

[Chart deleted.]

We will probably do some kind of demonstration of that system in a couple of years or so and using today's technology in order to put those sensors—remember, I am not trying to push it ahead for the demonstration, I am trying to get information out of the demonstration—that will be the head, that is, the front end equivalent to this.

That weights some 20 kilograms, about 48 pounds, or so. That is by TRW. It is a fine piece of equipment. I am not trying to put it down. It is using today's technology in order to do something.

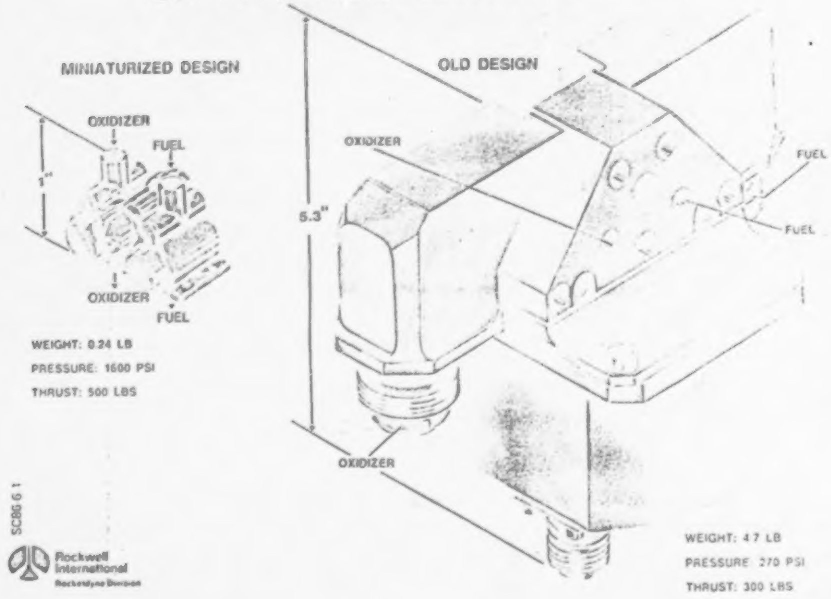
In order to get it up to the very high velocities, the kind we would require, that would require about a 700-pound rocket. It would require a very expensive rocket and one that is very, very large.

In our research we are already investigating uses of a smaller kind of rocket called the stage and a half, that would push that two and a half kilograms head forward in space and operate effectively. What we are talking about is a total vehicle, a total space-based kill vehicle with a front end on it, perhaps like that one, pushed by this kind of rocket that would not weigh more than about 130 pounds.

Notice what difference that makes. That is going from something on the order of over 800 pounds for the guidance and the propulsion, and remember that all cost a lot of money to get it up in space, down to something very small, very low cost and, hopefully, very effective in terms of bringing the cost of these systems down.

By the way, this stage and a half concept has already been tested, not the full rocket, but the first stage, and the different propellent concept which we have used out at the Air Force Rocket Laboratory in California.

Again, that is what we mean when we say we are looking for low cost systems and many of which can be applied across the board.



SMALL SPACE BOOSTER
ON-OFF BI-PROPELLANT VALVE

MINIATURIZED DESIGN
OXIDIZER
FUEL
1"
OXIDIZER
FUEL
WEIGHT: 0.24 LB
PRESSURE: 1600 PSI
THRUST: 500 LBS
OLD DESIGN
OXIDIZER
5.3"
FUEL
FUEL
OXIDIZER
WEIGHT: 4.7 LB
PRESSURE 270 PSI
THRUST: 300 LBS
SC86 6 1
Rockwell International
Rocketdyne Division

You do not stop there. We have to have little valves if you are going to use liquid propellents. Here you can see a valve which is a bipropellent booster valve to allow hydrazine or other kinds of oxidizers in systems to be able to drive a liquid propellent.

Here is a miniaturized design where you can see we are bringing down the weight by a factor of 10. That is what we are doing all across this system, trying to take things down by a factor of ten or a hundred in order to make it practical.

Now, you have heard me in the past talk about a rail gun, that one head which is passed around which could go on the front of a space-based rocket is also being designed so that it would have the capability to operate in the front of a rail gun.

Instead of being able to be fired at 5 to 8 kilometers per second by a more conventional chemical rocket technique, which might be the first generation of weapon—remember, I said we want to have confidence we can do the second generation as well—you would like to be able to use the same head because it will be cost effective, for a rail gun that you can fire between 20 and 30 kilometers per second.

Here is where we are doing the experiments on the rail gun.

Senator Exon. Could you go back to the last slide?

The front of the rail gun is where you have the round piece?

General Abrahamson. That would be this.

Senator Exon. That is on the front and that is the projectile?

General Abrahamson. That would be the projectile, yes, sir. It would be something you would aim directly in the direction where you are going, but this would have capability to maneuver sidewise and as it gets close so that it can maneuver in and kill the vehicle.

Senator **Warner**. General, we are anxious at an early juncture to hear from the Secretary.

General **Abrahamson**. All right, sir, I will close off very quickly.

Here is how some of these programs are tied together. We have already fired, not this whole system, but components, at 100,000 Gs, components that go into this to make sure that it will work.

This is the homing overlay interceptor that weighed over 2,000 pounds. That is where we hit the bullet with the bullet. That is an example of the parts of it.

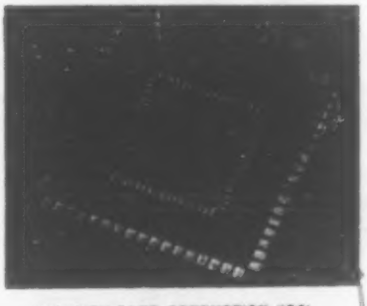
The next version and, by the way, this is one of the early systems, the ERS system. This is the kind of front end we are trying to build.

You can see it is, long, low cost and they have a clear contractual requirement to produce that for under a million dollars. Again, that is an area where we know the technology, where we have proved technical feasibility, and now we are going about the job of setting cost goals. That is a very important part of the whole effort.

AOA SENSOR MOCK-UP

Once again, one of our large projects is this one where we look out with a telescope into space and try to have an alternative in case satellites do not work. It would be an adjunct to a radar.

DETECTOR ARRAY TECHNOLOGY BREAKTHROUGH



IMPURITY BAND CONDUCTION (IBC) LWIR DETECTOR ARRAYS

- SUPERIOR TO CONVENTIONAL DETECTORS
  - RADIATION HARDENED, MORE ACCURATE
- ENHANCED SURVEILLANCE IN RADIATION ENVIRONMENT
  - CONTINUOUS TRACKING
  - CONTINUOUS TARGET/DECOY DISCRIMINATION
- SDI PROGRAMS IN PLACE
  - IBC TECHNOLOGY DEVELOPMENT
  - IBC ARRAY PRODUCTION

The eyes of the telescope would be in the top.

Here is a mockup sensor. But inside of this is a set of large mirrors and then very, very small infrared sensors.

We have advancements in effective, infrared detectors, which will be radiation hardened.

Here is an example of the kind of problem and where we are dealing with this command and control problem. If you look up on the left, you would like to be able to look out with an infrared sensor and just see a few of the real targets, those upper ones, those blue ones that would be the real warheads against the background of space.

Now, this is a simulation. Unfortunately, with the detectors that we have today you would see something like these red lines in the middle.

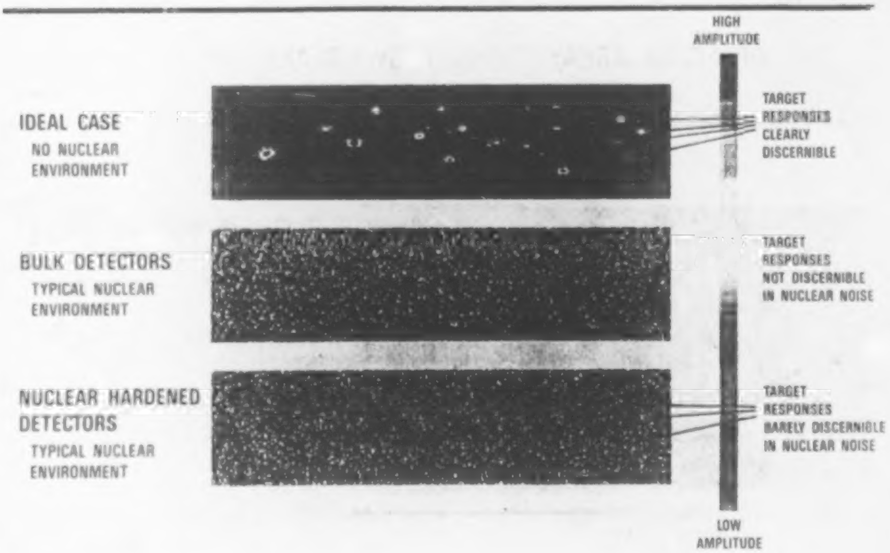
By the way, those are false color images; they are not the real color images, but they show different levels of what the infrared detectors are seeing.

The next box shows a combination of simulators, stars, decoys and of real warheads. You can see there is a real problem. Probably particularly against backgrounds of a nuclear explosion, we would have a very difficult problem.

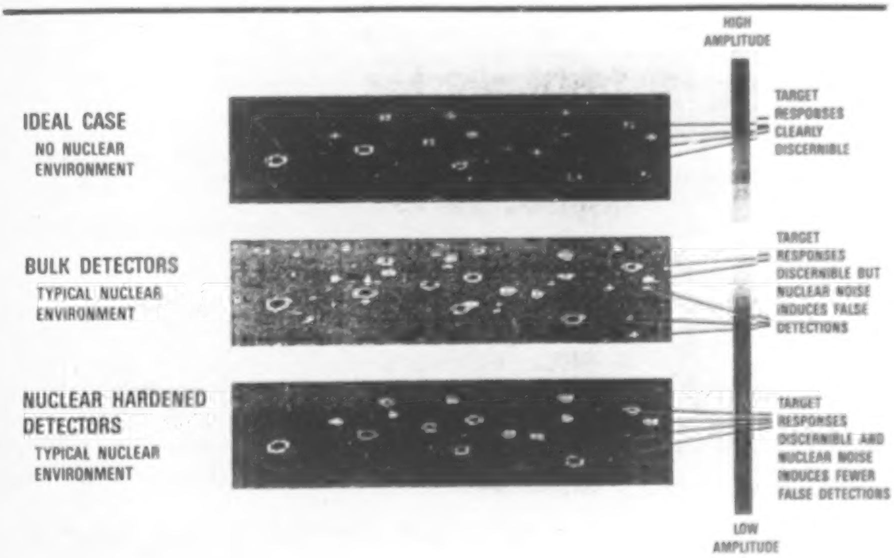
On the other hand, if we can get hardened detectors where the nuclear explosion does not affect the detectors, it gets a little simpler in this blue background.

A lot of the money is being spent on developing algorithms and processing the kind of information you get at the bottom.

INFRARED SENSOR IMAGERY
(BEFORE ELECTRONIC MITIGATION)


HIGH AMPLITUDE
IDEAL CASE
NO NUCLEAR ENVIRONMENT
TARGET RESPONSES CLEARLY DISCERNIBLE
BULK DETECTORS
TYPICAL NUCLEAR ENVIRONMENT
TARGET RESPONSES NOT DISCERNIBLE IN NUCLEAR NOISE
NUCLEAR HARDENED DETECTORS
TYPICAL NUCLEAR ENVIRONMENT
TARGET RESPONSES BARELY DISCERNIBLE IN NUCLEAR NOISE
LOW AMPLITUDE

INFRARED SENSOR IMAGERY
(AFTER ELECTRONIC MITIGATION)


HIGH AMPLITUDE
IDEAL CASE
NO NUCLEAR ENVIRONMENT
TARGET RESPONSES CLEARLY DISCERNIBLE
BULK DETECTORS
TYPICAL NUCLEAR ENVIRONMENT
TARGET RESPONSES DISCERNIBLE BUT NUCLEAR NOISE INDUCES FALSE DETECTIONS
NUCLEAR HARDENED DETECTORS
TYPICAL NUCLEAR ENVIRONMENT
TARGET RESPONSES DISCERNIBLE AND NUCLEAR NOISE INDUCES FEWER FALSE DETECTIONS
LOW AMPLITUDE

$1 billion reduction to SDIO fiscal year 1987 request would:

Eliminate lethality and feasibility assessments in key technical areas.

Slip feasibility recommendation of ABM defense from early 1990's to mid-1990's.

Longer term payoff efforts would be cancelled to protect near term options.

Sensors reduced from $1262.4 million request by $265.2 million to $997.3 million.

Experiments reduced from $659.0 million by $135 million to $524 million.

BSTS reduced to ground experiment only with survivability emphasis.

SSTS experiment reduced to flight experiment and minimal systems integration effort.

LWIR probe reduced to concept definition.

TIR terminated.

Technology reduced from $603.4 million by $130.1 million to $473.3 million.

Infrared efforts down selected to single focal plane array and crycooler concepts and teminates hardening program.

On-board signal processing effort reduced to a single architecture supporting a specific experiment (BSTS or SSTS).

Space based radar technology terminated.

Laser radar reduced to single concept.

Interactive discrimination reduced to theoretical studies.

Post boost vehicle data collection efforts terminated.

Weapons $2606.2 million reduced by $539.2 million to $2067.0 million.

Experiments $1748.7 million reduced by $361.8 million to $1386.9 million.

Delay confirming directed energy integrated experiments with longer term emphasis leading to mid 1990's FSED decision.

FEL boost-phase intercept capability.

Delay neutral particle beam experiment for interactive discrimination 2 years.

Acquisition tracking and point experiments reduced to concept definition.

Delays SBKKV development and experiments by 6 months.

STM II delayed 6 months.

Technology $857.5 million reduced by $177.4 million to $680.1 million.

Kinetic energy efforts to protect near term options reduced in scope.

Technology directly related to experiments continued. Far term technology to address prototype vehicle size and weight sharply curtailed.

EML research severely reduced in scope (effort cancelled).

Flight tests of miniature kill vehicles slip to 1989.

Battle management $462.2 Million reduced by $96.1 million to $365.1 million.

Experiments \$106.3 million reduced \$33.0 million to \$127.3 million.

National test bed milestones slip 1 year.

Battle management/C^3 experiments slippage 1½ years.

Technology \$471.8 million reduced by \$63.1 Million to \$408.7 million.

Supporting technology efforts slip 1 year.

Systems analysis \$143.1 million reduced \$30 million to \$113.1 million.

Reduced level of systems analysis introduces technical risk.

Support \$471.8 million reduced by \$99.6 million to \$372.7 million.

Baseload power not available to support space experiments, SP-100 availability slipped to late 1990's.

Preliminary weapons lethality assessment slips from fiscal year 1987 into fiscal year 1988 leading to final assessments to support a FSED decision into mid-1990's.

Particle beam and repetitively pulsed laser lethality assessments slipped to support mid 1990's full scale engineering development decision.

High powered generator discontinued, specifically 50 megawatt homopolar generator terminated.

Overall impact to SDI:

Reduction of high payoff, critical technical options.

Increased technical risk to FSED decision.

FSED decision delay until mid 1990's.

Here is what happens when you take those nuclear hardened detectors. Look at the very bottom. Your introduce some of those computer algorithms. You get rid of all of that. You can tell the targets just like you would want to be able to tell the targets at the top.

Once again, that is the kind of software work that is being done in the program.

PROPOSED FY 87 REQUEST

PROGRAM ELEMENT	($M)	FY 85 BUDGET	FY 86 BUDGET	FY 87 REQUEST
SENSORS		546	857	1263
DEW		376	844	1615
KEW		256	596	991
SYSTEMS & BM/C^3		99	227	462
SURV/LETH		112	222	454
MGT HQ		8	13	17
		1397	2759	4802

Those are examples and what I tried to do is get a little better understanding of not only the breadth of the program, but the depth behind each of these areas.

By the way, each of those elements of depth is very vital, but you cannot get some understanding that it will work or not work until you put it together in some of the larger experiments that are important as well.

Therefore, we are asking for a great deal of money to support these programs. You can see in the chart fiscal year 1986 budget and where we went from 2.75 absorbing a billion-dollar cut.

Our fiscal year 1987 request is in red—it is a little hard to see—$4.8 billion. It is a large increase, but it is one that we have already had to make some very significant changes.

I guess I would end with this point. We did not try to increase the program over what we told you it would be last year. Last year the 5-year run out for fiscal year 1987 before Gramm-Rudman and before the cuts that were given in the program, we had hoped that we would go from somewhere near $3.7 to $4.9 billion.

Our request this year is $4.8 billion. So, we have not falsely inflated the request in order to be able to absorb the cuts.

With that, I will stop.

[The prepared statement of General Abrahamson follows:]

PREPARED STATEMENT BY LT. GEN. JAMES A. ABRAHAMSON, DIRECTOR, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

THE STRATEGIC DEFENSE INITIATIVE

Mr. Chairman it is a pleasure to appear before the committee to discuss with you the strategic defense initiative. Three years ago President Reagan expressed the conviction that free people should live secure in the knowledge that their security did not rest upon the threat of retaliation to deter a Soviet nuclear attack. At that time he described the threat posed by increasing Soviet nuclear arsenals, and he proposed bold steps, embodied in a new initiative, to address that threat. This initiatve called for a comprehensive and intensive research program to pursue the advances in technology that have the potential for strengthening deterrence by introducing a defensive component to our deterrent posture.

Before I begin to discuss the SDIO's efforts in the intelligence area, I believe it is important to reiterate the program goals and objectives as we move into our third year. The goal of the strategic defense initiative is to conduct a vigorous program of research on emerging technologies in search of a better basis for a credible deterrence and strengthen the stability of peace through strategic defense. We envision that such a pursuit will offer incentives to the Soviet Union to join with us to reduce significantly or even eliminate ballistic missile forces. With this goal as a guide for the program let me describe for you the progress and status of the SDI as we begin our third year of the program.

Although this committee is certainly well aware of the nature of the Soviet threat to United States National Security, I would like to spend a short time discussing the Soviet efforts in offensive systems because certain points bear repeating. Since 1969 when the SALT I process was just starting the Soviet Union has built five new classes of intercontinental ballistic missiles and upgraded these eight times. As a result, their missiles are much more powerful and accurate than they were several years ago. The United States, in contrast, introduced its last new intercontinental ballistic missile, the Minuteman III, in 1969, which has been upgraded once. In addition, we are now working toward completely dismantling obsolete Titan II missiles. The alarming growth, both in quantity and quality, of Soviet ballistic missiles over the last decade is yielding a hard target, first strike force capable of accurately reaching its targets in minutes. The resulting asymmetry between Soviet and United States force structures has led to a destabilizing situation, one that must be redressed.

At the same time that it has worked to improve its offenses, the Soviet Union has continued to develop and improve active defenses. These active defenses provide the Soviet Union a steadily increasing capability to counter the retaliatory forces of the United States and its allies, especially if those forces were to be degraded by a Soviet first strike as provided for in Soviet military doctrine. Even today, Soviet active defenses are extensive. For example, the Soviet Union possesses the world's only operational antiballistic missile [ABM] system, deployed around Moscow. The Soviet Union currently is improving all elements of this system. The Soviets are also developing components of a new ABM system that apparently are designed to allow them to construct individual ABM sites in a matter of months rather than the years required for more traditional ABM systems. The Soviet Union also has the world's only operational anti-satellite [ASAT] capability. It has an extensive air defense network, which is continuing to improve, and it is aggressively improving the quality of its radars, interceptor aircraft, and surface-to-air missiles. The latest Soviet SAM's, the SA-10 and SA-X-12, also are capable to countering tactical ballistic missiles and possibly even some strategic ballistic missiles. It also has a very extensive network of ballistic missile early warning radars. All of these elements providing them an area of relative advantage in strategic defense today and with logical evolutionary improvement, could provide the foundation for a decisive advantage in the future. Since the 1960's, the Soviets have been pursuing research into advanced technologies for strategic defense. These technologies include high energy lasers, particle beam weapons, radio frequency weapons, and kinetic energy weapons. Moreover, during this same period, the Soviets have had an active and expanding military space program.

This information only reinforces our need to vigourously pursue the responsive threat/countermeasures programs in the SDI. Although the problem of predicting Soviet responses to possible procurement and deployment of a United States strategic defense system is extraordinarily difficult, the SDIO has developed a methodology and an organizational structure which will ensure that likely countermeasures and responsive threats are understood and evaluated throughout the technical evolution of the SDI Program. We recognize that a comprehensive understanding of responsive threats is critical to the development of a robust and survivable strategic defense system.

Any deployed defensive system would be required to operate against a variety of threat types and force levels. A defense system must, however, be capable of achieving the SDI mission objectives against the full spectrum of threats that might emerge over its operating lifetime, including responsive threats to all types. Accordingly, we have established a program to address the complete the set of responsive threat and countermeasures issues.

We have adopted a two part program to ensure that defensive system architectures and technology programs are sufficiently robust to achieve mission objectives, regardless of the form of the Soviet response. First, the SDI has established and will maintain, with the coordination of the intelligence community, the baseline responsive threat to a developed SDI-type ballistic missile defense system. The intelligence community provides analytic intelligence and threat definition support to the SDI on projected Soviet (and other) ballistic missile and defense suppression (attacks on the defensive system) threats to various types of future United States defensive systems. Second, in order to maintain system design objectivity, the SDIO has established "red teams" to independently examine and assess technical counters to proposed strategic defense systems and technologies. The overall approach of coordinated threat definition plus red team interactions is designed to integrate the most accurate and up-to-date intelligence analysis with detailed technical countermeasure analysis to assist the SDIO and the defense designers in understanding technical responses to a particular system or component. The process we have established will ensure that credible countermeasures and threats are continuously reevaluated and applied to technology development and system design so that any resultant strategic defense could successfully operate in whatever environment the opponents may create.

The principal attraction of layered defenses of the type SDI is studying is that no single countermeasure can negate the overall effectiveness of the system. It is important to recognize that the multiple sensors and multiple weapons of proposed layered defense systems demand that the offensive planner utilize many countermeasures if his system is to be at all effective. For example, if he chooses to develop a fast burn booster to avoid space-based neutral particle beam weapons, he must still contend with lasers. So, he must choose whether to harden each booster or build more boosters. Then, he has to think about how to deploy warheads and decoys; because even if he manages to negate much of boost phase by burning out early, the post boost vehicle is still a very lucrative target. Perhaps he can solve that problem by going to individually guided warheads, but he still faces the problem of deploying decoys which cannot be credibly accomplished for some time after the booster burns out. If he goes to individually guided warheads and decoys, then the warheads must dispense decoys. Then, he must deal with the next stage of the defense and so on. The problem becomes very complicated very quickly. Each counter utilized imposes a penalty either in reduced payload, reduced reliability, or reduced flexibility. Ultimately, the offensive planner must judge whether or not the cost has become too high, or his timeline too long, or his confidence in achieving his goals too low to pursue a given system. From this viewpoint, it is obvious that there are no super countermeasures which will leap the defense in a single bound.

Although there are uncertainties, we must anticipate Soviet programs across a broad front that includes technologies both to counter SDI and to improve their own ballistic missile defense capabilities. The requirement is to make predictions 20 or more years into the future. Clearly, the scope of the requirement to define Soviet responses over such a long time and over such a large range of possible actions is unprecedented in this country. Nevertheless, our responsive threat/countermeasures program is being vigorously pursued and will investigate, in an orderly and thorough fashion, every countermeasure we or anyone else can invent. This investigation will continue and robustness to all credible threats and countermeasures will be an essential criterion for SDI technology development and system design.

One point I wish to make initially needs to be fully understood: We are conducting the SDI program in full compliance with our treaty obligations and international agreements. The President has directed that the program be formulated in a fully compliant manner, and the Department of Defense has planned and reviewed the program (and will continue to do so) to ensure that it remains within the provisions of U.S. treaty commitments.

Before I discuss the fiscal year 1987 program I would like to discuss the realities of our program execution date. Some have asserted that the amounts of money we have requested for research are unprecedented and cannot be spent. In my testimony last year I indicated that I felt we would compare very favorably with the other services' research and development obligations and expenditures. In fact our obligation rate at the end of fiscal year 1985 was 94 percent, higher than the services and DARPA. Our expenditure of 40 percent was between the levels of the services. As far as SDI being unprecedented in requesting such growth in research and development funding, this is simply not accurate. The Manhattan and Apollo Program both experienced funding growth in excess of requests submitted by SDI.

Unfortunately, our requests for funding in previous years have been reduced significantly, forcing us to redesign program execution and planning. In fiscal year 1985 and fiscal year 1986 Congress reduced budget requests approximately 25 percent. Billion dollar reductions have caused us to accept higher program risks, prematurely down select certain promising technologies and in general pursue a more austere research program. The reduction of the requested budget levels by Congress has not, as yet, had the effect of slowing project schedules for the present proof-of-feasibility experiments. It has had the effect, however, of not allowing the SDIO to fund the alternative or fall-back technologies at an adequate level to minimize program risk. Thus, congressional budget reductions have had a harmful impact on SDI research and forced major program changes. We have been forced to reduce the effort on certain major technologies such as space-based lasers prematurely. This will increase significantly program risk and could cause program slippage, thereby delaying completion and increasing total costs. This is but one example of the many reductions we have been forced to make.

In fiscal year 1987 we are requesting $4.8 billion to support research for the strategic defense initiative. This funding level only attempts to move closer to the levels recommended by the Flecther study in 1983. It is imperative that we restore the funding levels if we are to reach our goal of providing sufficient information to support strategic defense decisions in the early 1990's. The fiscal year 1987 request supports the architecture development, major experiments, technology development, and innovative science and technology research to achieve that goal.

Our approach to reaching the goal of providing the defense options necessary for an informed decision in the early 1990's has not changed. Essentially the SDI, in order to be effective, must be able to detect the attack, track, identify and discriminate the target, intercept and destroy the target and to battle manage and coordinate all these activities. In addition, any proposed SDI system must be survivable and affordable. Our whole program is based on our desire to provide answers to these key technology questions to the decision making authorities, that is the President and the Congress, as thoroughly, rapidly and as cost effectively as possible. Our previous years' efforts have begun this process and the fiscal year 1987 request expands the information.

By late fiscal year 1985, phase I of the system architecture and tradeoff study was completed by ten insustrial contractor teams. Classes of architectures for ballistic missile defense were identified and key issues in achieving those architectures explored. Phase II, with the number of contractors reduced to five, is examining the classes of architectures and issues in greater detail. While we have found a healthy diversity of opinion on how to resolve key issues, we also expect agreement on the key features of ballistic missile defense architectures. Points of major importance that have emerged are:

The most robust architecture combines both space-and ground-based elements. The space-based assets are cofigured to provide effective defense during the boost, post-boost, and midcourse phases of the threat trajectory. They also provide self defense and protect against various defense suppression threats. The ground-based components are used to engage the threat during the late midcourse part of the threat trajectory and within the atmosphere at high altitudes. The large number of opportunities to engage the threat with this architecture leads to an expectation of achieving very low levels of defense leakage even if the enemy proliferates his offensive forces in response to our defense.

We must fully explore technologies that could provide systems to engage hostile ballistic missiles in the boost and post-boost phase. The leverage afforded by defensive action at these stages of a hostile ballistic missile's flight can be decisive. Conceivably, the highest payoff and the greatest return for the defensive dollar investment would occur in these phases, before deployment of a missile's warheads and associated penetration aids.

Data handling, along with command and control for technologies, for layered defenses must maintain a high priority within the SDI Program. No matter what evolves from our research in other areas of the program, reliable, resilient and responsive data handling and command and control capabilities are requisite.

Beyond the boost and post-boost realm, a high priority is to conduct thorough examinations of potential capabilities in other layers. The capability to perform defensive engagements in the midcourse and terminal phases is critical to the full exploitation of the advantages of a layered defense

Good exoatmospheric discrimination is essential to effective midcourse defense. In addition, midcourse defense with good discrimination capability can operate synergistically with the boost phase defense by offsetting the impact of fast burn boosters on boost phase intercept.

It is hard to overestimate the importance of the generation of realistic threat models, the estimation of the vulnerability of targets to the numerous kill mechanism options being exploited, and the development of strategies, tactics and technology to ensure system survivability to mission completion. These analyses and estimates will provide the boundaries for measuring success.

Success in nearly every element of the program is dependent on major advances in supporting technologies for space-based electric power, power conditioning low cost devices, space transportation and logistics.

We must accelerate examination of potential applications to the short-range threat. Our security is inextricably linked to that of our allies. We cannot confine ourselves solely to an exploration of technologies with promise against long range, land-and-sea-launched ballistic missiles. Thus, the architecture studies reinforce our views on the role of boost phase intercept; discrimination of decoys from warheads; midcourse and terminal intercept; basing of defense assets in space; command, control, communications and battle management; and threat modeling, surviviability, and target vulnerability. At the same time, our research has already yielded important results from efforts specifically addressing these issues.

In discrimination, we have seen outstanding progress in imaging, particularly through phased-array radar technology and signal processing improvements. Equally important, the directed energy efforts have given us an approach to "interactive" discrimination.

The surveillance and sensor program areas have witnessed impressive progress. Miniaturiation and advances in optical sensors have provided rapid gains in surveillance technologies. Multispectral measurements of booster, post-boost vehicle, and reentry vehicle signatures have been obtained by both optical and radar devices. These measurements allow us to understand threat signatures and will be used in the development of sensor technology. Additionally, we have achieved significant progress in technologies for hardening of high density microelectronic processors and infrared [IR] focal plane arrays against the effect of nuclear radiation that would be experienced during a battle.

In the directed energy field, work with atmospheric compensation and free electron laser technologies has progressed to the point where it appears that the potential for large, effective ground-based laser systems is very real.

In electromagnetic accelerator or "rail gun" research we have shown the ability to input high levels of power to these devices far sooner than expected. This means that heavier projectiles could be used and/or higher speeds attained.

A significant recent accomplishment has been the midcourse intercept of an actual reentry vehicle by an autonomous terminal homing interceptor. This experiment proved the capability of a nonnuclear interceptor launcher from the ground to demolish an incoming ballistic missile payload outside the Earth's atmosphere at a closing speed of over 20,000 miles per hours.

In hardening electronic circuits and devices for computers against nuclear radiation, we have fabricated and tested radiation-hardened, large scale, integrated circuits that show the potential for incorporating significant onboard processing for spacecraft in high radiation environments.

A distributed computer that networks several standard commercial computers into a virtual memory system is now operational. It is providing test beds for battle management concepts.

In lethality and target hardening, we have conducted many tests to analyze and quantify damage effects and vulnerabilities to radiation and high speed projectiles. One of the more graphic tests involved destruction of a rocket body by a laser on ground range. Other tests have examined the effects of x-rays on laser mirrors. Other effects tests have shown that small plastic projectiles traveling at 7 km/sec and impacting aluminum can create large craters.

The fiscal year 1987 program is designed to pursue the technology development and architectural definition previously established. Although it is well beyond the scope of this testimony to mention every program encompassed in the vast array of SDI-related activities being conducted by either the SDIO or the services, I would like to highlight some of the areas where we intend to apply the major thrust of our research effort in fiscal year 1987. This year our research is evolving more from the technology development into major experiments. These experiments are more costly, but beyond any doubt, are required in order to answer technology questions. The very complex details of technical content schedule, cost and deliverables in each of these experiments are included in our classified descriptive summaries and the report to Congress. I will give specific examples in my briefing but let me mention some examples of these experiments. Major efforts in fiscal year 1987 include the national test bed, the terminal defense tier tests, the endo-atmospheric interceptor, boost surveillance system, space base bm./c^3 and the free electron laser. Without the funding to progress to the integrated experiment stage that these examples represent we clearly will not be able to answer to the satisfaction of our decision makers that we have solved the technological questions we face. The integrated experiments are the logical next step, they were never portrayed as being inexpensive but without them the probability of determining if the SDI is feasible is very low.

As we move into fiscal year 1987, I would like to close by highlighting an area slightly outside the budget request itself. This past year we have shown progress in our dealings with our allies. Several allies have indicated support for SDI research and in some cases interest in participating. On December 6, 1985, the Secretary of Defense and the British Defense Minister signed a Government-to-Government agreement concerning SDI research involvement, and other allied governments appear interested in similar accords. United States and allied security remains indivisible and we will continue to work closely with our allies to ensure that, as research progresses, allied views are carefully considered. In addition to direct participation in the program, contributions by our allies could include innovative university research, individual exchanges, or subcontracts to U.S industry.

Mr. Chairman, I hope my testimony today can advance the dialogue and understanding of what we have accomplished in not only the overall SDI Program but particularly the threat/countermeasures program. I continue to be excited about the progress we are making and the challenges we face. I look forward to working with you, the committee, and your staff in pursuing the strategic defense initiative. Thank you for this opportunity to present our research program.

Senator **Quayle** [presiding]. The subcommittee will now turn to Mr. Perle.

Welcome back.

STATEMENT OF HON. RICHARD N. PERLE, ASSISTANT SECRETARY OF DEFENSE, INTERNATIONAL SECURITY POLICY

Mr. **Perle**. Thank you, Senator.

I will try to keep my remarks rather brief. I will make two observations.

We must recognize the Soviet Union has a program. If one were being briefed on their program and not ours, it would have been a very similar briefing with the exception perhaps that in the Soviet program the appropriate committees who pass on it would have been thoroughly familiar with it because it has been around for about 20 years.

Second, it is not surprising the Soviets have a program because the Soviets are deeply committed to and believe in the concept of defense and one sees that in their doctrine, in the structure of their forces, and in their exercises.

It should come as no surprise that in announcing a defense program, they include active defenses against ballistic missiles. Indeed, the Soviets may even now be in the process of breaking out of the ABM Treaty. One cannot be sure because there are intelligence uncertainties.

But the construction of an illegal ballistic missile detection and tracking radar at Krasnoyarsk, together with other supporting equipment and the capability that we believe some of their air defense systems have to intercept ballistic missiles gives rise seriously to the prospect that the Soviets may be acquiring an antiballistic missile capability for a nationwide defense even as we speak.

It seems to us that in attempting to maintain a stable strategic balance between the United States and the Soviet Union, it makes sense for us to exploit our strengths and to try to minimize our weaknesses. We presume the Soviets are doing precisely the same thing.

With respect to the development, production and deployment of offensive forces, intercontinental ballistic missiles with nuclear warheads, the Soviets hold a number of significant advantages. There is no public reluctance to continue to build and deploy these systems. They can be deployed anywhere in the Soviet Union.

They can be deployed, for example, on rail cars in a manner that I doubt seriously would be approved in this open society of ours.

By contrast, the deployment of mobile missiles in the United States would almost certainly have to be limited to military land and there is not very much of it. We are reluctant to move missiles in and out among our population for understandable reasons. In an open society such freedom of movement entail risk that would not be experienced on the Soviet side.

So, it seems to us that to compete with the Soviet Union in the production and deployment of offensive missiles is tantamount to playing on their field; to playing where they are strong.

In contrast, the introduction of defenses that would offset the Soviet offensive deployment gives us an opportunity to exploit our strength, some of which General Abrahamson demonstrated this morning as he displayed some of the technological developments and achievements of the program, even in this relatively early stage.

So, it would seem to this administration, at least, that in attempting to maintain a stable balance, we should not exclude the introduction of defenses on our side to offset offenses on the Soviet side, recognizing we may have some long-term advantages with respect to defensive technologies and systems even as the Soviets have advantages with respect to the deployment of offensive systems.

This brings me to the central point I wish to make this morning which is that it is extraordinary to the point of being unnatural to circumscribe the development of strategic forces in a manner that excludes one, and one only, type of defense system; that is, active defense against ballistic missiles.

Yet that is precisely what the critics of the strategic defense initiative would have us do. The critics recognize that passive defense is a desirable thing. We put concrete around missiles to protect them so that they can survive attack. We move them around to protect them. We hide them under the oceans to protect them. We even use active defense, where we can, such as surface-to-air missiles, to protect aircraft. We protect our airbases, airfields, and the like.

The concept of defending our particular critical military assets is well understood in every dimension, active and passive, except somehow there is a great blank when one comes to protection against ballistic missiles, in particular, intercontinental ballistic missiles.

I say this is unnatural because it is, on the part of those who subscribe to it, a purposeful development in the gap, a vulnerability on what we believe is the mistaken theory that it is somehow desirable to protect one's self against all threats except ballistic missiles impacting on our national territory.

Looked at from that perspective, the development of strategic defenses seems a natural filler of the gap that the Soviets are not going to permit to exist on their side and we ought not to permit to exist on ours.

Hence, the research program is aimed at establishing whether it is possible to deploy effective ballistic missile defenses with reasonable budgets and in a manner that will produce stability.

Our great concern is that through a combination of budget limitations and reservations about the program itself, we will end up slowing down and encumbering the American research program even as the Soviet research program goes forward. That carries with it the prospect that the Soviet Union might emerge ahead of the United States with the capability to deploy a strategic defense system.

Among all the arguments that one hears for or against strategic defense, I think we can get a consensus around the proposition that the worst of all possible outcomes would be one in which the Soviet Union alone emerged with a strategic defense capability which, when combined with its formidable offensive capability, would raise serious questions about whether the United States could maintain its historic and bipartisan deterrence function.

So, we would appeal to this committee not to compel us to slow the program, not to stretch out our efforts with the consequent risk that the Soviets will cross the critical finish line first. Indeed, it is of sufficient concern that they may already be crossing that finish line with a possible breakout from the ABM treaty with conventional ABM technologies.

Senator **Hart**. What finish line is that, Mr. Perle?

Mr. **Perle**. The achievement of the capability to deploy strategic defenses of the type that General Abrahamson has been describing; in particular, the capability to intercept ballistic missiles in the boost phase.

Now, of the elements of the American program, the one that seems to us the most promising is the capability to intercept Soviet ballistic missiles while they are over Soviet territory or in space above the Soviet Union.

There are several reasons for this, some of them technical, but perhaps the most important is that if we can intercept Soviet ballistic missiles in the boost phase, we will have intercepted them prior to the point at which they discharge their multiple warheads and, in effect, a boost phase capability would be the functional equivalent of deMIRV'ing the Soviet military force.

I know there are some on this committee who believe that the development of multiple, independently targeted reentry vehicles has been a major source of instability in the relationship between the United States and the Soviet Union.

I submit to you that boost phase intercept means depriving the Soviet ICBM force of its multiple, independently targeted reentry vehicles because if you get the booster, you get all the warheads associated with it.

Of course, it would scale back the dimension of the defense problem by an order of magnitude. If one assumes that Soviet missiles have roughly 10 warheads, then one needs only one-tenth the number of intercepts in order to achieve required levels of effectiveness.

So, we are very keen in particular to develop the boost phase intercept capability and believe it offers a potential for a kind of stability that we have not seen for many years and, indeed, some long for in reflecting back on the preMIRV period.

If I may say a word, Mr. Chairman, about discussions with our allies and allied interests in strategic defense.

I just returned from the Federal Republic of Germany where we settled on an agreement that would define the basis for German participation in the SDI program. The German Minister of Economics is in Washington today. I suspect that by sometime tomorrow morning, we will have signed an agreement with the Federal Republic which will make them the second NATO ally to sign such an agreement following the United Kingdom.

It seems likely that other NATO allies will follow suit and perhaps some non-NATO allies as well, with intense interest on the part of the Israelis.

I think by the time the committee has before it next year's SDI authorization, we will see very broad participation by the majority of those countries that were invited to participate in the program.

We welcome this. We think that the contribution made by scientists and technicians and industry in a number of allied capitals will reduce the cost of the program and enable us to move it along more rapidly than would otherwise be the case.

I must say that we are gratified that after the initial, it is fair to say, negative reaction to what is, after all, a new concept—a concept that appeared at first glance to challenge the notion of deterrence—we have seen an evolution of allied opinion in the direction of support for this program and we are gratified by that.

Let me say one last word if I may, about the bearing of the ABM Treaty on all of this, on what General Abrahamson has said, and my own remarks.

The President has said from the beginning that we will conduct this program within the limitations of the ABM Treaty. That seems to us good common sense. To withdraw from that treaty with only a research program in prospect would not make much sense. We need to validate the direction that our program is taking.

We need to be very confident that it is possible to achieve success before going to the Soviets with a view to restructuring the ABM Treaty in order to permit deployments that would in turn create a better balance between offense and defense.

Throughout human history there has been a relationship between offense and defense. It has been an inevitable product of technology and human activity in seeking a safer and more stable situation for one's own country. I think it is inevitable here too, and the question is how we manage an effective introduction of defenses rather than pretend that we can live out the century and beyond with only offensive weapons.

I think it is foolish to believe that we can somehow raise our hands in front of the development of modern technologies and believe that there will never be active defenses against ballistic missiles in the arsenal of either power.

If it is going to happen eventually, if not in this century, in the next, it seems to us important that the United States be in the forefront of those developments and not chasing behind them.

So, we will reach the point with respect to the treaty where difficult decisions will have to be made, as General Abrahamson indicated.

Now, as it happens, a careful reading of the treaty makes it quite clear, in our view, that all the freedom that we require to conduct this research program and to carry out necessary testing and development is permitted under the terms of the ABM Treaty.

Senator **Warner**. The restrictive version?

Mr. **Perle**. Under the only version we recognize to be legally correct, which is based on a careful reading of the text of the treaty and the negotiating record that was developed at the time.

As you know, things were said about what the treaty meant, subsequent to the treaty, that are not borne out by a careful reading of the record or, indeed, a careful reading of the treaty itself.

On an interim basis, the President had decided, as you know, to confine the United States to a more restrictive interpretation of the treaty than is legally correct. If in the long term, we were to remain with that restrictive interpretation, then we would face the question of whether to depart from the treaty, not after we had completed all work on SDI, but at a stage prior to its completion.

That seems to us a very foolish situation to get ourselves into where the decision to depart from the treaty would have to take place before we knew whether we had the prospect of an effective and reliable defense.

So, in the long term, it seems to me highly likely that if not this administration, some other administration will consider that there is no rational basis for long-term adherence to a restrictive interpretation to which the Soviets are not bound. We have made it very clear that our interpretation of what is legally correct permits the Soviets to conduct both testing and development of systems "based on other physical principles".

So, they are free of the burdens that we have for the time being assumed for ourselves. I suspect that in the long run that will prove to be an untenable policy.

Senator **WARNER**. Let me see if I can rephrase that last presentation.

You are saying we are getting to a fork in the road. One turn of the fork would require an administration to transition from the restrictive interpretation of the treaty to the broader one which you feel is justified by the negotiating record.

The other fork would be to go directly to the Soviets and again to renegotiate the treaty.

Is that a fair characterization?

Mr. **PERLE**. If I could put it a little differently, Mr. Chairman.

We will come eventually to a fork in the road where we either stay with the restrictive interpretation of the treaty or abandon that restrictive interpretation.

If we stay with the restrictive interpretation of the treaty, then we will get only so far with SDI and no further. We will still have in front of us a great deal of the development and testing that will be necessary in order to determine whether it makes sense to go forward with the deployment.

Under the legally correct interpretation of the treaty, we would face that point after the completion of testing and development, but before deployment when we had reasonably certain knowledge of whether it made sense to go forward or not.

The question really is: Do you face the question of how to proceed at the end of the research phase or after you have completed the development phase?

It seems to us prudent to go all the way through the research, development, and testing, before laying concrete proposals on the table in Geneva, about how we might reorganize the ABM Treaty.

Senator **WARNER**. To take that course, you have to transition off this restrictive doctrine?

Mr. **PERLE**. That is right.

Senator **WARNER**. When do you think, General, that would occur on the time line of R&D?

General **ABRAHAMSON**. It is a variable kind of thing, sir. Obviously, the earlier that one does such a thing, the earlier you can replan and begin to structure the program more directly leading to the decisions and to the high level of confidence that one would like.

So, it is variable. There is not a time that you are forced to. On the other hand, you could save money, time and gain, perhaps most important, gain a higher level of confidence from the results by going more directly.

There is a time, however, as you approach the end of the decade where, frankly, the money becomes much less efficient because you are continuing to put that money into these partial tests.

Senator **WARNER**. Can you give us a more specific time?

General **ABRAHAMSON**. We have not planned all of that very, very carefully.

Senator **WARNER**. Let me interrupt just a minute.

We will start the 5-minute limit for questions.

General **Abrahamson**. Because we have not planned it very effectively, I cannot give you a good responsible answer. If we could start as soon as possible to begin to do that, we would arrive there very quickly.

Senator **Warner**. When you indicate as soon as possible, that could be tomorrow morning?

General **Abrahamson**. Right now, of course, for a good solid reason, the President has indicated it is in his and in the national interest to maintain the restrictive interpretation.

Senator **Warner**. Also the defense budget is quite restricted in its funding.

You have indicated that certain savings could be achieved. Therefore, the Congress has a responsibility to determine, I suppose, whether savings could be achieved if the President were to elect a different course now.

Mr. **Perle**. If I could, Mr. Chairman, there is also a question here of an orderly way to do business in the long run.

I do not believe the committee could make an intelligent decision about whether to withdraw from the ABM Treaty or propose renegotiation of the ABM Treaty with the Soviet Union on the basis of the kind of testing that is permitted under the restrictive interpretation.

We simply will not know enough. We will have partial systems of partial systems, tests in which the components have been downgraded in order to meet the restrictive interpretation that we believe is no longer legally valid.

What I believe this committee will want to know before it makes a decision, what any committee would wish to know, is whether there is a reasonable prospect that the system will work. In order to do that, you have to do some testing. You would never buy aircraft that have not been tested. I am quite sure you would not buy a strategic defense that has not been tested.

The question is: Do we have to come to the committee at some point in the future—and this is years away, it is not in the lifetime of this administration—with an untested system and ask you to take a great plunge in the dark or do we come to you with a record of test results that enables an intelligent decision to be made?

It is for this reason I say that it is simply a matter of time before the legally correct interpretation becomes necessary to the program.

Senator **Warner**. In your judgment, this decision point is beyond this administration?

Mr. **Perle**. The decision to proceed to deploy is beyond the administration.

Senator **Warner**. How about the decision to gather the civilian test data for an informed judgment to be made about the system, which test data I understand cannot be adequately gathered under the restrictive view?

Mr. **Perle**. There I think the sooner that decision is made, the greater the progress and the more efficient in financial terms the program will be.

Senator **Warner**. The decision to abandon the restrictive view and, in your opinion, the history of the treaty negotiations and the record will enable that testing to take place?

Mr. **Perle**. That is correct.

Now, there are political factors as well as to why the decision was made early on to stay with the restrictive interpretation.

I must say that decision was also made because at the time the program has been configured to remain within the restrictive interpretation and, therefore, it appeared to be irrelevant to the actual working of the program.

Senator **Warner**. The transitioning from the restrictive to the broader interpretation of the ABM Treaty is under review by the administration?

Mr. **Perle**. It is under continuous review as implications of the success of the program can be measured and studied.

BUDGET REDUCTION IMPACT

Mr. **Warner**. Now a question to both of you. First, the impact of the reductions in the budget.

General, the impact on the technical point.

Secretary Perle, the impact from the standpoint of the arms control negotiations.

General **Abrahamson**. Sir, obviously, it depends on the amount of what a proposed cut might be. Since we have seen cuts on the order of 21 percent the first in the program and 25-percent cuts in the second year of the program, I considered it quite clearly my responsibility to do what everybody else has been doing and that is to make choices in the program.

I believe that we have made the majority of those choices so that that is not available as a means of absorbing cuts in the future.

So, the impact of cuts of that order of magnitude again would be an appreciable change in either the schedule or the very appreciable reduction in the amount of confidence in some of these tests which follows right along with Secretary Perle's comment about concerning tests in what way.

It would be like—I have done it in a sense here, putting all of the parts of a Ferrari out on the floor of the garage and saying you can see we can build this crankshaft and you can see we can build a carburetor, so I know we are building a 200-mile-per-hour Ferrari.

I think the key point is in addition to that, you would want to see the overall system, at least test the motor and, hopefully, the motor in conjuction with some of the other parts of the car.

Senator **Warner**. Now, with respect to the implications on arms control or other relationships between the United States and the Soviet Union.

Mr. **Perle**. What we know, Mr. Chairman, is that in the nuclear and space talks the Soviets have taken the position that there can be only one outcome and that is the abandonment by the United States of the SDI program. They have shown no flexibility in talking about the transition to a proper mix of offense and defense.

I think it is fair to conclude that they are waiting to see whether we have a real program or not. To the degree to which we reduce the funding and encumber the program, they will, I believe, stick to that unproductive policy line in Geneva and we will be talking past them.

Senator WARNER. What is the impact on our allies and their participation in this program?

Mr. PERLE. They are just now getting into the program. I do not think there is any question that if we suffer a cutback in the funding, they are going to be less successful in pursuing contracts and disappointment will set in rather rapidly, I expect.

Senator WARNER. Senator Hart.

Senator HART. Thank you, Mr. Chairman.

Mr. Perle, in the process of helping the committee to know whether to disagree or agree with the administration on the restrictive versus expanded interpretation of the treaty, will the administration make the negotiating record available to the committee, something I think we have asked for at least informally?

Mr. PERLE. I think, Senator, there may be some adminsitration-wide policy driven more by a concern about precedent, than anything else, about running over details of negotiating records.

If it were up to me, it would be OK because it would help the committee.

Senator HART. Many of the people, as you know, including Ambassador Smith, who made that record, disagree with the administration. We are faced with testimony before the committee by people who made the record disagreeing with the administration and the administration not making the record available to us.

It is a horrible dilemma for us. I think if you could find out who makes that decision and let us know, it would be helpful to us.

Senator NUNN. Would the Senator yield?

Senator WARNER. I know a little bit about the present status. My letter formally requested that. We concurred in that.

Judge Sofaer, who is chief counsel of the Department of State, is now looking into that. He is going to meet with the staff of this committee today.

Senator NUNN. May I ask one other thing on this last line?

On December 5, Frank Gaffney, Mr. Perle's assistant, was here. I asked him to provide a copy of the report that was done for DOD under contract by Systems Planning Corp. of the ABM Treaty on No. SPC 85074, and also with Colonel Fitzgerald.

I was under the impression we were going to get that report. It has been 4 months and we do not have it. I think the chairman joined in that request.

Could you also put that one on the list of items we would like to have?

Mr. PERLE. Yes.

Senator WARNER. We will see that it is done.

Senator HART. Secretary Perle, you led off as you have before with the concern about Soviet developments in this area. I am confused about whether you think that is good or a bad thing.

My understanding from the President and others is that we encouraged a shift from offensive to defensive capability and that is in fact what the Soviets are doing.

Is that not from the administration's point of view a good thing?

Mr. **Perle**. I think there is a difference between the shift from offensive to defensive and addition of defense and continuing growth of offenses.

Senator **Hart**. That is what we are doing also, are we not?

Mr. **Perle**. I would like to see us moving in the direction of an emphasis on defense at the expense of offense. I think we ought to regard them as alternatives in a balanced force posture and to the degree to which we can achieve a capable deterrent by a combination of defense and offense, we would need relatively less offense.

Senator **Hart**. The fact is that neither side is doing that. We are both pursuing both offense and defense. From that point of view, the Soviets are doing exactly what we are doing?

Mr. **Perle**. I do not think it is fair to say that we are both doing the same thing, because there is a sustained growth of offensive forces on the Soviet side that we would like to see halted and we are prepared in the context of a halt in that program to negotiate significiant reductions in offensive forces.

It is not in our interest to see offensive forces continue to grow, Senator Hart. Our whole approach to arms control has been based on achieving deep reductions in offensive forces.

Senator **Hart**. At the present time what both sides are doing is building up their offensive and defensive capabilities.

Mr. **Perle**. We are for the most part replacing systems on the verge of obsolescence with modernized systems.

Senator **Hart**. That is what they claim they are doing as well.

Mr. **Perle**. In fact, what is happening on the Soviet side is a very rapid introduction of new systems in addition to systems which were deployed as recently as 5 years ago. The average age of a launcher that carries an American nuclear weapon is something on the order of 14 years.

The average age of the Soviet launcher that carries a nuclear weapon is something like 5 years. They have been through a cycle of modernization and even so, they are on the verge of another generation while we are attempting to modernize systems built in the seventies and, in fact, pursuing the plans of previous administrations.

Senator **Hart**. General Abrahamson, in the first paragraph of your testimony you seem to deviate from what the President has stated the policy of SDI is. In the sentence that reads:

> This initiative calls for a comprehensive and intensive research program to pursue the advances in technology that have potential for strengthening deterrence by introducing a defensive component to our deterrent posture.

The President, as I understand it, has called for replacement of our offensive capability by this defensive capability.

Now, it seems to me what you are saying is adding to our layering on the offensive with the defensive.

General **Abrahamson**. I do not believe that is the case at all, Senator Hart. There have been several publications and, obviously, they are short speeches in that they have been interpreted in many different ways.

In a White House pamphlet in January 1985, the President indicated that they way to move toward the eventual elimination of ballistic missiles is to move gradually through the swing, as I indicated, going through the replacement and the reduction of offensive forces with increasing capability in defensive forces, and, obviously, it is very difficult to predict how or when, but the eventual objective would be aimed only at ballistic missile defenses at this point, not all of the other kinds of systems.

So, I do not believe that it is inconceivable at all. I may have emphasized the first step in the process instead of the last step.

Senator HART. So, the first paragraph really is a reflection of an interim phase, in other words?

General ABRAHAMSON. That is quite consistent, again, with the pamphlet in the way it was laid out explaining the progression of the program.

Senator HART. Midway through your testimony you talk about architectural design, and the number of contractors reduced to five.

> While we have found a healthy diversity of opinion on how to resolve the key issues, we also expect agreement on the key features of ballistic missile defense architectures.

When will we have this, if at all, this agreement on overall architecture and not healthy diversity?

General ABRAHAMSON. Again, this is also a progressive thing. The agreement is on the larger components associated with each one and we are now in the process of moving forward into the next stage where you are beginning to get very, very specific tradeoffs at a lower level for each of the capabilities.

Frankly, some of those things are still dependent on some of the development process. Let me give you an example of that.

One of the key elements and one of the areas of very healthy agreement, and we know everyone agrees with, is that it is vital that we be able to discriminate between warheads and decoys because one of the likeliness if we think the Russian reaction will be to proliferate a very large number of decoys.

We want to ensure that we can tell the difference between those decoys and the warheads so that you can expend your efforts against the real warheads.

There is also clear agreement that in fact just passive means alone, just infrared sensors, even if there is some very capable imaging, infrared sensors may not be efficient to do that.

Where we have not come to final agreement are the cost-effective means of doing interactive discrimination, which means you would actually reach out and in some way probe those groups of warheads and decoys.

There are several techniques which we know are technically feasible and can work in a nuclear environment in the future. Let me give you two of them.

One is to expose a cloud of decoys and warheads to a neutral particle beam and be able to get the signal that is given off from the heavy nuclear materials and be able to tell the difference between that and the things missing, signals from the decoys.

Another version is to be able to reach out with a laser and in fact actually move the light materials and you might not move those with others.

Both of those we know are technically feasible. Both of them are based on in-house tests we have done already.

The next question is: What is the most cost-effective tradeoff between those concepts? We are still examining that.

Senator HART. Leaving aside the individual components, the point is this: When will your principal contractors who are studying architecture be able to agree on what it should be, if at all, and then when can that be presented to Congress, if ever?

General ABRAHAMSON. I think we already have by laying out some of the principal conclusions here. We have presented to you both the level of agreement and some of the areas of disagreement and what the implications of those are. Further, we have presented to your staff members very detailed architectural studies.

Now, this is a complex business and we are talking about hours of understanding in order to be able to do that.

Senator HART. You just testified that there is still healthy diversity among the principal contractors over key elements.

General ABRAHAMSON. Over certain key elements of it. I would say healthy diversity does not mean that every contractor is running off in completely different points of the compass. There are major elements of disagreement.

Frankly, one of the things is the people who know and understand space-based lasers have not given up on that idea. Some of the people who know and understand space-based kinetic kill vehicles have not given up on that idea.

But there is sufficient agreement that we have made choices. The choices include a ground-based laser as our principal method of going ahead. Therefore, we have kept the ground-based laser in a high, accelerated version, and I testified to that, and that, I think, is the key element of information that you and the Congress need to be aware of, that the other laser techniques, some of the space-based lasers, are throttled back on.

Now, those are still important, they are still good. I have not made them zero in order to cut them out because there are indications of some breakthroughs that might, in fact, be useful. So, they do warrant some minor funding.

Again, in the very tight budget environment that we have there is sufficient unanimity amongst our system contractors, sufficient unanimity on the examination of countermeasures that we have undertaken that I have made the decision and we are going ahead on a ground-based laser. That is the key element that I think you need.

If, again, you would like to go into more detail, we will be happy to do that. We have done that with many of your staff people. They have not decided it ought to be green and have seven red bolts on it.

Senator HART. General, you are demeaning the argument. It was your testimony that said healthy diversity about key elements, not details.

General ABRAHAMSON. That is right.

Mr. PERLE. Could I make a point, Senator?

The fact that there is diversity does not mean that some people who hold views hold wrong views and other people who hold views hold right views.

There are preferences where taste is a fashion in these things. Many people who work on space-based lasers are naturally keen to see space-based lasers predominate in the system. People who work on ground-based lasers have preference for those. Either has advantages and disadvantages.

One could construct a system based on any number of possible architectures. People could argue for years about whether the right one had been selected or not without invalidating the one that had been selected.

Senator WARNER. Senator Quayle.

Senator QUAYLE. Thank you very much, Mr. Chairman.

General, very briefly I want to make sure I understood your response to Chairman Warner. You indicated that the restrictive interpretation of the ABM Treaty is a hinderance to the SDI Program. Those are not the exact words you used, but I gather from that, the restrictive interpretation does in fact pose problems to your development of the SDI Program.

Is that correct?

General ABRAHAMSON. The answer is yes. It is quite clear that if we have no hinderance whatsoever of any kind and we can go directly in a test that would be convincing to not only ourselves, but to the Members of the Congress, that that direct method is the most cost effective and the quickest way to get to any one particular objective. We think that it can be cost effective.

Now, there are very real reasons, very good reasons, by which the decision, the political decision, has been made to——

Senator LEVIN. I did not hear the end of the answer. Political reasons?

General ABRAHAMSON [continuing]. To have to deal with the question of the restrictive interpretation of the treaty.

The way we have laid out the program, we did not plan it in a nonrestrictive way. The entire test structure has been planned in accordance with the restrictive interpretation of the treaty. We never did do anything differently than that. We did not even feel that a less restrictive interpretation was acceptable.

As that decision was made in the State Department by the legal staff regarding the legally correct interpretation, that has raised a new opportunity which we are just beginning to examine and when and where is the right time and the right circumstances to make that change, I am not an expert on that. That is above my pay grade.

Senator QUAYLE. Laying aside the political judgment that has to go into these decisions, from a technical point of view, in your capacity, a legal interpretation of the ABM Treaty would be helpful; is that correct?

General ABRAHAMSON. Yes, sir.

POTENTIAL BUDGET CUTS TO SDI

Senator QUAYLE. That is what I am trying to establish.

The second question I have concerns the budget. Both of you have alluded, as a rather standard response, to potential budget cuts in SDI. You both have said that the program will be stretched out, that the program will not be as efficient, costs will ultimately be higher. I do not dispute that contention.

Let me give you another option you may have to pursue as the budget crunch becomes inevitable and that is instead of dragging out the program of going with the policy of making sure that we have healthy diversity of research efforts, that you may be forced to re-think your procurement strategy.

I compliment you on trying to have this horse race type of approach and get as many things in there as possible, but I am very fearful that we are coming to a stage of SDI that we have to convince the critics, of the viability of this program, and if, in fact, you accept the budget restraints and the budget reductions in the normal way you have outlined here today, you are really going to play into your critics' hands because you are going to push off any demonstration of this program down the road.

The further it is down the road, the less acceptance it will have on Capitol Hill in the years ahead.

I just want to throw out this option for discussion that you might have to rethink this, that if you do get budget cuts, you will have to take a fast, narrow track on the most promising technology which ultimately might lead earlier to a critical decision on the ABM Treaty, and might lead to an actual deployment earlier rather than later.

Does this scenario have any viability?

General **Abrahamson**. I understand exactly what you are saying. I share the concern you have laid out about the overall implications of the program.

I would like to separate the difference between the procurement strategy which is one thing and some of the new ideas that we have introduced and the fundamental principle of what I think you are talking about.

The principle is rather than have the luxury of carrying forward so many concepts and delay the program, because you cannot carry forward all of them the way it was orginally planned, we are already doing that. If I failed to get that across, that is terribly important.

I used the example of free electron lasers. I did not choose to take the original plan laid out with all of the technology road maps and take all the directed energy concepts forward and bring them forward to the point that was originally planned where they demonstrated feasibility at a higher level.

I thought, in fact, I would not have been living up to my responsibility, both to you and to the taxpayers and to the program of the President if I just did that. Indeed, I made selections, I made some of them prematurely, early. That added risk to the program, but I made this selection.

I said we will go with the ground-based laser and that is our principal laser technique. We are putting in as much money as we can in order to keep that on as fast a track as possible. I did not cut out all the other ones, but I throttled back in a very substantial way. I have done that in as many years as I could do logically.

Now, one element of the program I wanted to get across is that this is not a single system. This is not a B-1 and the choice whether we are going to make a judgment between one engine and another engine. It is a system of systems. As such, it does require a whole series of those. I can make those choices once in a program.

I believe that I have made a very substantial percentage of those choices already. Otherwise, I would not have been able to cut out $1 billion, 25 percent of this program. There is no other program that I am aware of in the Department of Defense anywhere near this priority that had that kind of cut of 25 percent unless it was judged, for whatever reason, that it ought to be eliminated, period.

Therefore, in fact, I think it was a political cut as opposed to one based on the merits of the program.

I recognize you have a very difficult budget year. I recognize that you have probably the toughest decisions ever. But I would ask that you make a judgment based on what you can afford and not on a political judgment against the program or against what the President's idea of the program was.

I have made those decisions to the maximum extent that I can at this point. What I was saying is that there is a necessary minimum amount of technology that should go forward. You cannot make those decisions more than once and get those savings more than once. I hope that I have not made them incorrectly. We have tried to make them prudently and well.

Now, separating that from the procurement strategy, the procurement strategy is a very important one and I know it is one you are interested in and I hope this is consistent with some of the things you are laying out.

Where we have a horse race, where we have multiple contracts operating, those are where we are looking for diversity and looking for the best team in the part of the program where it is least expensive.

For example, where we had seen system contractors operating in the horse race as quickly as possible. Those 10 only operated for $1 million each and we got many millions of dollars worth of effort out of that beyond what the Government invested in it.

The intent was to get the best horse, the real thoroughbred, the one that will go fastest and can organize best. So, then we chopped down in the next phase.

The same philosophy is being introduced in the national test bed. That is going to be many hundreds of dollars worth of effort. It is worth carrying a few extra million dollars, and it is not many, it is on the order of really a few, less than 10, for this first phase in order to pick up the team that can get together and run faster and most efficiently.

So, please do not consider that the decision structure on the program and confuse that with a competitive philosophy in order to get the most for the least dollar. I think they are acceptable.

If you would like to go further, I can explain that very carefully.

Senator WARNER. I believe the Senator's time is up.

Senator Exon.

Senator EXON. I believe Senator Levin was ahead of me, Mr. Chairman.

Senator LEVIN. Thank you, Senator Exon and Mr. Chairman.

Going back to the question of the restrictive versus the broader interpretation, General, when does that issue become relevant under your present plan? Give us your approximate view.

I was not clear on your answer to Senator Warner's questions in that regard.

General **Abrahamson**. At this point the program has been planned under the restrictive interpretation. Therefore, the entire plan of the program which says that you will run up against treaty issues and, hopefully, have some confidence level in the early nineties so that you can make that decision is still in effect.

What we are saying is that if there were an appropriate time where our relationship with the Russians and all of the policy and political issues that Secretary Perle talked about, that if we could make that decision to go to a broader interpretation as early as that can be made, that will allow us to save money or to arrive at a point of equal or higher confidence level for you when that decision is made.

Senator **Levin**. Your comment refers to a restrictive interpretation and assumes continuation of adherence to that restrictive interpretation?

General **Abrahamson**. Yes.

Senator **Levin**. Now, Secretary Perle, what was your role in the new interpretation that came forward?

Mr. **Perle**. I think it was limited to translating my bewilderment as I listened to different people interpret the treaty differently into a request to a lawyer to go back and read the treaty and examine the negotiating record.

Senator **Levin**. What was the name of that lawyer?

Mr. **Perle**. Phil Kunsburg.

Senator **Levin**. Did he prepare certain materials for you?

Mr. **Perle**. He prepared a memorandum, an analysis of the treaty negotiating record. He had the great advantage, compared to others who have come to the same subject, of not having been involved earlier and, therefore, he read the documentation with a fresh eye.

Senator **Levin**. Would you make available his memorandum to this committee?

Mr. **Perle**. I would be perfectly happy to do that. I think I would have to obtain clearance. I think it is the same issue that Senator Hart raised earlier.

Senator **Levin**. I do not think there is an issue at all involving this. This has nothing to do with classification. This has to do with a lawyer-client relationship.

My question to you is: Will you make available that memorandum?

Mr. **Perle**. The memorandum draws heavily on the negotiation record. I think there is still an issue as to the extent to which the negotiating records should be made available.

As I said, my own preference would be to make it available.

Senator **Levin**. Could we add the memorandum that Secretary Perle has referred to to our list of requests for documents in this regard, Mr. Chairman?

Senator **Warner**. If I understand it, the chairman and Senator Hart sought to have the negotiating record made available to this committee.

Senator **Levin**. I join very much in urging this.

Senator **Warner**. This document is a lawyer-client document. As I understand, this is counsel to the Secretary of Defense who prepared it.

Am I correct?

Mr. **Perle**. He is on the legal staff of the Defense Department.

Senator **Warner**. He is one of several lawyers to the Secretary. That is a separate issue.

Mr. **Perle**. That may be. Which is why I indicated I would have to get guidance on this.

Senator **Warner**. I would have to examine whether this is a different category from the right of this committee asking for that document.

Senator **Levin**. Mr. Chairman, while we are making reference to documents in this regard, there was a book written by John Newhouse called "Cold Dawn" where he made reference to national security memoranda of the 1970's.

Are you familiar with those decision memoranda relative to the question of exotics and whether or not they were banned under the ABM Treaty?

Mr. **Perle**. I think I would have to go back and look at the book to see which memoranda are referred to.

If I may say so, Senator Levin, one of the problems in the interpretation of the treaty is that our negotiators, try as they might, did not always succeed in prevailing with the Soviet side.

Senator **Levin**. My question is what our understanding was of the ABM agreement. That is a critical question.

Are you familiar with Newhouse's book?

Mr. **Perle**. I read it when it came out, but that was a long time ago.

Senator **Levin**. Mr. Chairman, there are very critical statements made in this book about our understanding of the ABM Treaty and whether or not the development of space-based exotics was covered. There are references to three decision memoranda of the National Security Council of 1971 on pages 230 and 231 of this book.

Apparently Judge Sofaer was not either familiar with them or had not read these memoranda. These are Presidential decisions as to what to accept in that treaty. This administration seems to think it is all irrelevant what our understanding was.

They go back and look at the record and find some words they can construe to come up with an interpretation totally different from any interpretation in the last 13 years. They have a right to do that. We have a right to take a look at the decision memoranda that went to the President of the United States and National Security Council.

Mr. Chairman, I would ask that in addition to the items that you are requesting, to which we still do not have a response after all these weeks—indeed, I think it is months—that you add the national security decision memorandums Nos. 110, 117, and 127.

Senator **Warner**. Senator, I am searching my own memory. My recollection is at no time did we require this of counsel.

Senator **Levin**. They provided it to an outside contractor for analysis.

Mr. **Perle**. Senator, I am as impressed with the national security decision memorandums as you are. One thing they cannot do is compel the Soviet Union to agree with us.

Senator **Levin**. The issue here is what our understanding of this treaty was, at least in part. Administration after administration after administration said it understood this to ban exotics in space. It is a restrictive interpretation.

Then we have a lawyer who comes along and gives you some opinion that is the basis then of a later opinion by Judge Sofaer. It seems to me we should have a copy of that opinion. There is some question whether we should get a copy of that memorandum.

I am referring now to a book written about three National Security Council decision memorandums. It makes reference to it. The White House staff prevailed on this issue. I do not know if they did or did not. This writer says NSDM 127 bans everything other than research and development on fixed, land-based exotics.

In other words, the development on the space-based exotics was banned in a certain memorandum.

Let me finish because my time is up and I have to keep talking, I cannot ask another question.

What I am asking the chairman to do here is to get these documents which were the basis of a Presidential decision on our understanding of the ABM Treaty. I think that is critical material. We have given some of that material to an outside contractor, apparently.

Senator WARNER. Senator, that is the aspect I have to look into, whether or not the privilege has been lost by virtue, and I am just repeating what you and others have said, of its having been given over to the contractor to write the book. I can assure you that I will continue to pursue a satisfactory resolution of our concerns through the appropriate channels with the administration.

Senator LEVIN. It is not this contractor. It is a contractor named——

Senator WARNER. I promised Senator Exon to give him his full measure of time.

Senator LEVIN. Thank you, Mr. Chairman.

Senator EXON. Mr. Chairman, I do not want to get out of line.

Unfortunately, my time is up before I start. So, I will be very brief. I will be within my 2 minutes if I can get prompt answers to two questions.

First, Secretary Perle, you are an expert on defense matters by training and by background and certainly by experience. We have a lot of respect for you.

You also have expertise and a basic understanding of defense budgets and costs and the restraints under which we are operating, both in the Budget Committee and here in this committee and in the Appropriations Committees to follow.

Now, given these restraints, how can we possibly double the SDI research program? In what specific areas do you think you can take funds from for a $2 billion increase in SDI?

What are the proper priorities within the defense budget and where do we cut to allow for this large increase in SDI?

Mr. PERLE. Senator, I do not know that it is necessary to cut. I think there is probably an inclination to do so. I cannot tell you.

Even if I had my own preferences, the administration policy on these matters is that the budget we have sent up is the minimum budget that we think is in the national interest. Cutting it would be dangerous and ill-advised.

Let me say that I think this is, if we had to choose among programs, our highest priority program, because it offers the hope that we may find a better way to maintain a stable deterrent balance.

Senator Exon. You are saying it is a high priority item and should not be cut. But if we have to make cuts you do not have any recommendations?

Mr. Perle. I do not have recommendations only in the negative sense that I would not cut this program, I would cut elsewhere.

Senator Exon. Thank you. That is a direct answer. I appreciate it. I wish you were still a member of the staff of this committee, then we could press you a little bit further.

General, let me ask you one question.

I congratulate you for your presentation this morning, I think it is important that the people know and see some of these things rather than just hear about them. I think all this information is helpful to us and to the public.

Do you employ any, what I call, incentive bidding procedures in all of those contracts that you have out?

If I were a contractor or a scientist I would like to have you develop a part of our program. I would have to depend upon your judgment regarding costs, and pay you an agreed price upon completion, even if partial or unsatisfactory.

On the other hand, incentive bidding procedures would provide if you are successful, you would get a higher remuneration. If you were unsuccessful, your compensation would be less.

Is there any of this in SDIO contracting?

General Abrahamson. Yes, sir, there is. In fact, there is a great variety of incentives that are used; some of them are business incentives. Other incentives pay off if the contractor can come in more quickly and, with higher levels of technical performance and still others are profit incentives of the kind you talked about. They are usually tailored to the specific contract. We use a great variety.

So, the answer is yes.

Senator Exon. Thank you.

Thank you, Mr. Chairman.

Senator Warner. Thank you for your patience, Senator Exon.

Senator Wilson.

Senator Wilson. Thank you, Mr. Chairman.

I arrived just in time to hear the last of my friend from Michigan's question. I gather they had to do with the broad and narrow interpretation. I do not know what problems there are getting whatever documents we may be interested in seeing.

I would have to say to him and others that I think while that may be an entertainment for lawyers, that as a practical matter, what we really need to be concerned about are supervening events and whether or not it is in the interests of the United States to pursue SDI, not just those elements of it that are clearly within our treaty obligations, but also those that may push the outer limits and even exceed them, because it seems to me what we should be doing is what you can do to achieve a defensive technology that can, in fact, make us a good deal safer and if we can negotiate an agreement with the Soviets on that basis, fine.

If not, we are obliged to go forward unilaterally.

Let me ask this question of you, General Abrahamson. Others share that view, I might add.

One, most interestingly, voicing that is the architecture of détente, the former Secretary of State, Kissinger, who has made the statement that we should bite the bullet and say we are going to deploy and if the Soviets have the ability to build their own, you can bet your last cent they would do it.

One of the things that I think we need to be concerned about in the near term is whether or not we are making adequate progress either in conjunction with the Europeans or otherwise in developing antitactical ballistic missile defense.

You touched on that somewhat in your presentation this morning, but it is not clear to me whether or not you think that we need any additional authority to do work in that area, there needs to be a directive in respect to the President's strategic defense decision to allow you to engage in that.

General **Abrahamson**. I believe that we do not need additional direction, sir. I think that the direction is there.

We are not as mature in our thinking in all elements of that, but we are really trying to press on that and go very quickly. For example, I discussed with the Ministers of Defense at the Nuclear Planning Group Meeting that we held last week that we could have a request for proposal for ATBM architecture studies, perhaps a "horserace," in Europe. Although it would not be limited exclusively for European contractors. American proposers could bid as well under the limits that have been placed on us in Congress.

The focus of the horserace will be on this question of what is the optimum architecture and the best means of achieving this in a European or other theater environment. I committed that we would expeditiously consider how the United States could contribute to allied ATBM efforts and perhaps have a proposal on the street in as early as 30 days.

I believe that our problem is not authority to go ahead in these important areas. I think that our problem is resource limitations.

Senator **Wilson**. Let us pursue that point.

DEVELOPING AN ANTITACTICAL BALLISTIC MISSILE

Does the chart to develop an antitactical ballistic missile defense expand your requirements and given the rest of your charts, are you saying you are going to need additional resources in order to pursue ATBM?

General **Abrahamson**. Not additional resources above what we requested. $4.8 billion is enough to have an aggressive start in that overall effort.

On the other hand, if we were forced to take a substantial cut of the kind of cuts we have had in the past, that effort, just as our other efforts, would be a candidate for cutting and for finding a way to live within the means that the Congress would allow us to operate.

Senator **Wilson**. Personally, and I think I speak for other members of the committee as well, while I intend to support your full request and do so vigorously, it seems to me one of the most urgent priorities, not because it is treaty compliance, it happens to be, but because of the threat posed by the new Soviet capability in terms of their payload, is to develop this kind of defense.

I supose we have to be able to respond to what you anticipate the Soviet response to that may be.

General **Abrahamson**. Yes, sir.

Senator **Wilson**. Secretary Perle, what comment have you on Secretary Kissinger's quote about our deploying it?

Mr. **Perle**. I agree with what Secretary Kissinger has said. He makes the point, I think fairly, that we should be clear about our intention, that is, if the research program is successful, if we conclude we have available for deployment a strategic defense, that is relatively insensitive to countermeasures and to increases in the Soviet offense, which I think is what people have in mind when they talk about cost effectiveness, then we ought to go ahead and deploy it.

I cannot see any reason for not doing so. I agree with Kissinger's views that if the Soviets were in a position to move forward, they would not hesitate. The difference is that the Soviets would tear up the ABM Treaty if they had a strategic defense they were ready to deploy whereas we would observe the appropriate treaty procedures.

Senator **Warner**. Senator Wilson, will you yield to me?

I have to go to the floor and manage a bill. I want to ask a few quick questions and then if you will chair the subcommittee.

General Abrahamson, in the article in Foreign Affairs by former Secretary Harold Brown taking the position that current technology will not support development and deployment until sometime in 1993 or 2000, how does that coincide with your view?

General **Abrahamson**. Sir, I believe that the whole thing depends, of course, on two things, the success of our research as well as the resources that are provided.

I have indicated, I believe, under the present restrictions and with an appropriate allocation——

Senator **Warner**. When you say restrictions, we have to talk explicitly about ABM restrictions, funding restrictions. We have a lot of restrictions.

General **Abrahamson**. Both ABM and funding restrictions. I believe that we are on a course at this point in time to make a go-ahead decision in the early 1990's.

What I mean by that is somewhere between 1990 and 1992, somewhere in that timeframe. I cannot be more specific because I cannot project exactly how much money we will get and what we will do in terms of biting the bullet in terms of going ahead. But if we made that decision, I do not accept Secretary Brown's allocation of time that is required then to transform technology into a beginning system; in other words, the time required for a development program.

I believe that we are doing the research wisely and that we are trying to build the proper infrastructure to give us the confidence to proceed.

Senator **Warner**. Transition far more quickly, in your judgment, than in his form an R&D Program to a full program.

General **Abrahamson**. So that in the mid-1990's one could move, if that decision was made in time, and begin deployment. Beginning deployment is not having a robust deployment all of a sudden. It is beginning to build up over time.

As evidence of carrying out an aggressive program, I would take the F-16 where once we had developed a prototype——

Senator **Warner**. Let me go to another question.

Are you certain that the technologies associated with ATBM defenses are kept separate from work on the strategic ballistic missile defenses to ensure that an ATBM system could be developed and deployed consistent with the ABM Treaty?

General **Abrahamson**. Yes.

Senator **Warner**. A good short crisp answer.

Last, Mr. Perle, would the deployment of strategic defense by the United States and our allies be supportive of our long-time strategy of nuclear response?

Mr. **Perle**. I believe it would greatly increase credibility of the American commitment to use nuclear weapons if necessary for the defense of our allies.

Senator **Warner**. Thank you.

Mr. Wilson, will you chair?

Senator **Wilson** [presiding]. Senator Levin.

Senator **Levin**. Thank you, Mr. Chairman.

Senator **Warner**. Mr. Levin, we will work on both of those inquiries.

Senator **Levin**. I would like to make a matter of record at this point, Mr. Chairman, my question of Judge Sofaer requesting documents that he received from the Defense Department lawyers and his response to me was that the request for the material should be made to them and not to him. That is the reason for my request this morning.

Judge Sofaer said, "Do not ask me for the material they supplied me because they are the ones who supplied them. Ask the Defense Department."

I think the request for these materials is becoming critical. We have been waiting for answers on these materials for a long time.

There was an outside contractor, and I repeat this to the Chairman, who has reviewed the negotiating record. It came to the exact opposite conclusion of Mr. Perle. That will have to wait until we get the documents. As long as the record is clear on that.

Thank you, Mr. Chairman.

So that we know what documents we are talking about here, Mr. Secretary, as I understand, Colonel Fitzgerald of the SPC Corp. did review the negotiating record relative to the issue we have discussed this morning; is that correct?

Mr. **Perle**. I was unaware of that.

Senator **Levin**. You are not familiar with that analysis by Colonel Fitzgerald?

Mr. **Perle**. I am not.

Senator Wilson asked the question relative to negotiating a change in the treaty to permit deployment of defensive systems and then I believe said something like if we cannot negotiate a change in the treaty to deploy those systems, we should go ahead unilaterally, or words to that effect.

Senator **Levin**. Is that the position of the administration?

Mr. PERLE. I think that anticipates the situation that is far in the future, but the treaty does provide the right of either side to withdraw. I believe we would act in conformity with the treaty provisions if we decided it was in our supreme national interest to proceed.

Senator LEVIN. Have we made that decision yet?

Mr. PERLE. No.

Senator LEVIN. So, we have not decided that we would either withdraw from the treaty or we would deploy these systems in the event we could not negotiate a change in the treaty?

Is that right, we have not made that decision?

Mr. PERLE. That is right because we have not yet been able to establish whether the research program will succeed.

Senator LEVIN. For whatever reason, though, we have not reached the conclusion that we would deploy in the event we could not negotiate a change in that treaty?

Mr. PERLE. That is correct, because we do not have the system yet to deploy.

Senator LEVIN. We are going around in circles. Whatever the reason is, we have not made that decision?

Mr. PERLE. That is right.

Senator LEVIN. Why can't we say that is right?

Mr. PERLE. If you will permit me to say so, I believe that we would be well advised to deploy if we had a successful conclusion of a research and development testing program, whether or not the Soviets agree with us to deploy.

Senator LEVIN. Has the administration reached that conclusion?

Mr. PERLE. I do not think it has because it is awaiting results of the research program.

Senator LEVIN. You are not awaiting results of the research program before you decide we would be well advised to deploy.

All I am asking is whether the administration has decided.

Mr. PERLE. I think I am ahead of the administration.

Senator LEVIN. Ahead or behind, depending on one's perspective.

Now, is the administration willing to negotiate the subject of additional limits on SDI testing or development of deployment?

Mr. PERLE. Additional to what?

Senator LEVIN. To the ABM Treaty?

Mr. PERLE. No; we are not interested in further limiting our freedom to conduct research, development and testing.

Senator LEVIN. So that my question is clear, is it the administration's position that they are unwilling to negotiate any additional limits on SDI testing or development or deployment? Is that the administration's position?

Mr. PERLE. Yes; I believe that is the administration's position.

Senator LEVIN. Now, you said this morning that the broader interpretation is the only version that we recognize to be legally correct. That was your testimony this morning?

Mr. PERLE. That is right?

Senator LEVIN. I think that is different from what Judge Sofaer told us and I think what Secretary Shultz said which is that we believe that the broader version, in their words, is fully justified.

Were you speaking for the administration when you said this morning that the only version that we recognize to be legally correct is the broader version?

Mr. PERLE. I believe so. I do not see how the two versions, which are incompatible on a number of points, can both be legally correct.

Senator LEVIN. So, if you believe you are stating the administration's position that there is only one legally correct version, not a perferred and secondary version, but there is only one legally correct version and that is the broader agreement?

Mr. PERLE. I do not see how one could maintain simultaneously two contradictory interpretations.

Senator LEVIN. General, I have a couple of questions.

You indicated that the President has said the SDI should emphasize nonnuclear kill mechanisms. You used the word "emphasize."

General ABRAHAMSON. Yes.

Senator LEVIN. Are those his directions?

General ABRAHAMSON. My charter in each of these areas is to emphasize nonnuclear kill mechanisms to find out if it is cost effective and feasible to use those kinds of systems.

Senator LEVIN. Did he say in his direction to you that you should avoid nuclear mechanisms?

General ABRAHAMSON. No, sir, he did not. He said to see if it is possible.

Senator LEVIN. So that the direction is to emphasize the nonnuclear, but not totally avoid the nuclear?

General ABRAHAMSON. I think the key point is, as I indicated earlier, that there is a national reason to understand the potential of nuclear weapons to be used against such a system or against our offensive system and to examine that pragmatically and carefully, but clearly that our preference is to try to produce a nonnuclear capability.

Senator LEVIN. To go back to my question, his direction is to emphasize the nonnuclear, but he did not say to totally avoid them; is that correct?

General ABRAHAMSON. That is why in the testing program——

Senator LEVIN. Is my statement correct?

General ABRAHAMSON. Yes; and it is amplified in the policy that has been signed between Secretary Herrington and Secretary Weinberger that indicates that we will conduct nuclear testing as part of the systems, first and foremost, to examine whether or not they would be used against us and how dangerous they might be in a broader context even in SDI.

Second, obviously, during that examination to see if there is a clear advantage for those systems. It depends on how powerful they might be. I think that is a fairly obvious statement.

If it is a very, very powerful system, then it would modify your planning in accordance with that very powerful capability.

Senator LEVIN. Was the answer to the question yes, that my statement was accurate?

General ABRAHAMSON. That is to emphasize nonnuclear.

Senator LEVIN. The President always says this is a nonnuclear system.

General **Abrahamson**. Surely he hopes we will be able to produce it and there is real evidence that we will be able to do that.

Senator **Levin**. The nuclear testing is part of the nonnuclear system, is that not true?

General **Abrahamson**. Yes, as I indicated, to understand——

Senator **Levin**. I know the reasons for that.

Nuclear testing is part of the so-called nonnuclear system, is that not right?

General **Abrahamson**. I said nuclear testing is part of a research program. When you are talking about a system and when the President talks about a system in the future, he is talking about what that might be if we proceeded in going ahead and testing it.

Very often a great number of our critics confuse the difference between a research program that is competently and properly carried out on a broad scale in order to understand both what can be used against you and for you and confuse that with what a final outcome might be.

Senator **Levin**. You describe this as a nonnuclear research program?

General **Abrahamson**. I would describe it as one that is emphasizing nonnuclear means for a future system, but does include, as I testified and I have testified time and time again, that it does include nuclear testing.

Senator **Levin**. So, therefore, you could not describe it as a nonnuclear research program?

General **Abrahamson**. I stand exactly the way I said it, that it emphasizes——

Senator **Levin**. You are not answering my question. I know what the emphasis is.

But would you describe this as a nonnuclear research program?

General **Abrahamson**. Sir, you are trying to put me in a position of saying something that has to be either black or white.

Senator **Levin**. The President says this is a nonnuclear research program.

General **Abrahamson**. No, sir. He says that he would like for this system to be a nonnuclear system if and when deployed someday.

It is a research program. That is exactly what I have indicated. Its emphasis is nonnuclear. The great majority of the money and the effort is nonnuclear.

Senator **Levin**. Your recollection of the President's words is very different from my recollection of the President's words. We can check the record easily enough.

RED TEAM DOLLARS

Where in your budget is your Red team dollars? Are you able to tell us what part of your proposed budget?

General **Abrahamson**. It is in the systems part of the budget.

Senator **Levin**. Could you show that budget chart on the screen?

General **Abrahamson**. Yes, sir. Where it says systems and battle management C^3. You can see where it is building, in 1986, $227 million, up to $462. I say most of it is there.

Actually there are parts of it in each of the development and research efforts that are throughout the rest of the budget, but most of it is in that part of the budget.

Senator LEVIN. Can you tell us what the total budget is for your Red team efforts?

General ABRAHAMSON. I have not counted it up that way because, as I indicated, part of it is in the program efforts themselves.

Senator LEVIN. Could you do that for the record?

General ABRAHAMSON. Yes.

[The information follows:]

Indicate total budget for Red teams.

[In millions of dollars]

	Fiscal year—		
	1985	1986	1987
Red team	$0.7	$12.2	$17.3
Total countermeasures program	.7	18.9	26.4

Senator LEVIN. I have some questions for the record to both witnesses.

Thank you, Mr. Chairman.

Senator WILSON. Mr. Perle, let me ask a question by Senator Warner. It states, Mr. Perle, would the deployment of strategic defenses by the United States and our allies be supportive of our strategy of flexible response?

Mr. PERLE. He did have an opportunity to ask that question and I answered affirmatively.

Senator WILSON. I thought he did. I thought I recollected both the question and the answer.

General Abrahamson, I am concerned that what you have presented today takes us through what is unquestionably valuable and necessary research, but it seems to me that we are not nearly as close to deployment as I would like to be.

General ABRAHAMSON. I share that, sir, we are not as close to deployment as I would like to be either.

Senator WILSON. I think it is obvious there are differences on the committee with respect to whether or not we should leave those aside for the moment. I think Secretary Perle and I are both in advance of the administration, but let us assume we did not have any legal barriers. It looks to me as though the system that you are setting forward there is one that does not take us to deployment very soon.

Yet I just heard one response that indicated you anticipated certain parts of the system would be deployed by the mid-1990's; is that correct?

General ABRAHAMSON. Yes, sir.

ATBM DEPLOYMENT

Senator WILSON. Apart from legal constraints, how quickly can we expect deployment of the ATBM system?

General **Abrahamson**. In order to give you a good and thoughtful answer, I would have to provide it for the record.

The whole key in both an overall system and in an ATBM is the battle management and control system and the sensors that go with it. That is the key.

For an ATBM system, the key element of examination in our architectural tradeoff studies will be to what extent we can use existing battle management and to what extent we can use existing radar systems or other sensor systems and how much we can build on that.

I do not have that answer at this point. My guess is, however, that we can do it sooner than we can an overall system, but it will require a lot of attention on this battle management sensor part of the problem.

Senator **Wilson**. That optimistic view that this is one of the aspects of the initiative that is susceptible of early achievement is shared by our allies?

General **Abrahamson**. Yes, sir.

Senator **Wilson**. It seems to me that there are compelling reasons to give that very high priority. I am a little bit concerned and a little bit confused because at the conclusion of your statement—this is what prompted my earlier question—you say:

> As we move into fiscal year 1987, I would like to close by highlighting an area slightly outside the budget request itself.

You then proceed to discuss joint activity with the allies supporting SDI research. You point out that there is interest and, in fact, there is more than interest, there are at least preliminary agreements.

In light of the threat, in light of the very considerable advantages in working with the allies in either joint research or ultimately in production, this is counter to whatever decoupling influences the Soviets and others have sought to bring to bear.

But, more than anything else, it is the increased capability and the threat of the Soviet nonnuclear missiles.

General **Abrahamson**. That is correct.

Senator **Wilson**. And not, as your own statement points out, just NATO. We have on our own coastline Soviet submarine-launched missiles.

Does it have that priority within the architecture you are describing?

General **Abrahamson**. I honestly believe we are starting behind, that we did not start as aggressively in this area several years ago at the time of the initial studies which gave us a leg up on the ICBM problem. We are not as aggressive in this particular area.

I am trying to move as fast as I can to make up for that initial coming from behind. I am very encouraged about that in Europe in particular, but in the other theaters as well that people see and understand now much more clearly than they did envision months or a year ago just what a real problem the Soviet threat in this area represents.

For example, there is a tremendous increase in accuracy of their ballistic missiles and how that can or may be able in the future to offer a nonnuclear threat which we cannot counter even with our strong air defense at this point.

Now, we do have some operational programs that give us a very first step in that area in the Patriot upgrade. For example, the improved Hawks do represent those operational programs. Those are ongoing within the U.S. Army and they are quite separate from the SDI.

However, because I do recognize that we can build on some of those technologies and some of the communications systems, I have made the Army the executive agent. It is still a triservice program. Still it will require triservice activities for the theater range threat.

I try not to use the term "ATBM" because I think all too often, at least in many minds, it suggests the answer is a simple missile. A missile is part of the answer, but the more demanding part of the answer is the command and control system and warning system that goes with it.

Senator WILSON. My perception is also that we are behind and perhaps not just behind, but behind on that element that seems to me is the most critical in need.

General ABRAHAMSON. Yes.

Senator WILSON. The fact that it is slightly outside the budget request gives me great pause. If it is, in fact, outside the budget request, I do not think it should be. I think whatever you need, you should move as expeditiously as your own technology will permit within the budget and given very high priority.

General ABRAHAMSON. The parts of the budget that are outside of the budget request would be implementation of any of the operational kinds of activities. The research and the architectural work and those things are within the budget and, obviously again, as I indicated earlier, with a full budget we will be able to give those a much more robust start than we would if we had a substantial cutback.

Senator WILSON. So, explicit direction to you from Congress contained in the DOD bill to focus on that effort and give it priority would not require additional funding and would not be resisted by you?

General ABRAHAMSON. That is correct.

Mr. PERLE. Could I just make one brief comment?

Senator WILSON. Secretary Perle.

Mr. PERLE. While it is true we start further behind than would be desirable, we are not alone and the gathering interest in Europe on this is very encouraging.

I just returned from Europe. The German Minister of Defense has given a speech recently strongly recommending a European approach.

Senator WILSON. I heard one speech in Teracunda and his article on strategic review makes an excellent case for it.

Mr. PERLE. This has been echoed in Italy, even in France, and the United Kingdom. If I had to guess, before this committee has finished its deliberations with our bill, there will be a European initiative to which it would make sense to us to relate by giving support and sharing technology.

Senator WILSON. I quite agree with you.

My concern is whether or not we are prepared to move smartly on the initiative. Let me ask both of you a question in response to a different threat.

SOVIET MULTIPLE MISSILES

The Soviets are expanding their inventory of multiple missiles. At some point they had something like 30 percent of that total inventory in that regard. Were we to deploy a mobile missile, the thinking now, I think both in-house and in the Air Force and in the Senate, is that they would probably be tied either to the base in the Southwest or military bases.

In any case, we are looking at a geographically confined area even under the dash scenario in contrast to which the Soviet circumstance is that whatever number or regiments they have, 80 or so ultimately, or the road mobile, even a nonroad mobile, they have eleven time zones in which to hide in a heavily wooded area.

So, we are talking about an area that would be very difficult if not impossible to us, given the limitations on our own warhead inventory, not to mention the difficulty of the target. While there seems to be some division in the intelligence community on that, the conservative view is that that is an honest problem.

Does not that fact alone, even though you considered that mobile inventory of the Soviets to be a second strike, does that not pose a rather compelling argument as to the necessity for getting on with this defensive technology as quickly as we can?

Mr. PERLE. I believe that it does.

What concerns us is not that the Soviet mobile force is a second strike force in the sense in which we maintain a second strike force, but that it is a third strike force, if you will, the reserve to be retained following a first strike and be beyond the reach of our retaliatory forces, intended to discourage a response from the United States.

I think you correctly identified this is a concern that underlines the importance of strategic defense.

SOVIET MOBILE MISSILES

Senator WILSON. Secretary Perle, I cannot resist the temptation since we have you here and are not likely to get you back again soon, I have asked now about the Soviet mobile missiles. We are confronted with a decision as to how much of our resources we should allocate to competing strategic accounts. The argument for mobility obviously relates to achieving some survivability and stability.

Accepting all of that, if we are in a situation where we are attempting to adhere to what has been a long-held view as a requirement for deterrence, that is 1,500 prompt hard target killers, which goes back beyond the Scowcroft Commission's recommendations to an earlier national security decision, if we are going to have that necessary minimum to have a credible land-based deterrent, what is the judgment that you would render with respect to the proposition that if we are capped at 50 Peacekeepers, we attempt to achieve deterrence with a mobile missile inventory. If you do your arithmetic, if you are capped at 50 Peacekeepers, you would have to go up to a thousand.

In a single launcher configuration, single warhead, that is 1,000 Midgetmen which GAO estimates to cost $88 billion. In a time when we are attempting to bring in Gramm-Rudman discipline that we will eliminate our deficit by 1991, I see an enormous competition between ATB, between Trident, between SDI, and between Peacekeeper, for that matter.

If it is not entirely problematical, we will achieve a basic system that will persuade Congress-to go forward. I suggested that we need to try to cut the cost of the small missile.

I would be interested in how you see the competition in terms of our achieving the maximum deterrent posture with the research that is available for the missile.

Mr. PERLE. I think, Senator, that it makes no sense at all to deploy Midgetman in a single-warhead version. It is extravagantly expensive. It would in effect waste some tens of billions of dollars compared to feasible and reasonable alternatives.

You could easily put a second warhead on Midgetman even, in my view, at its current weight and configuration. That would significantly reduce the number that we would have to build and operate because this is not an inexpensive system to operate for a given level of warheads.

I think in the larger sense I would prefer us to develop more resources to defensive and rather less to offensive forces. I think you can achieve a better, more stable balance, one that is less subject to deterioration, less subject to technical breakthrough on the other side, less dangerous in the long run if you have a balance of offensive and defensive forces.

So, I would very much hope that the arms control efforts underway in Geneva would lead to a banning of the mobile ICBM and that the money saved thereby would be put into strategic defenses which I think in the long run, highly leveraged as they may be, will afford the prospect of much greater stability at lower cost.

I think we would be better off, the Soviets would be better off, the world would be better off if we had minimal offensive forces sustained and supported by sizable defensive forces because in that situation there is no incentive no matter how severe the crisis, to initiate a first strike.

The effect of a first strike is unilateral disarmament since that strike would be intercepted and the other side would be left without any launching capability and the side defending would still have to hold its offenses.

I think it is long overdue to make a transition to a balanced strategic posture in which defenses have a significant role to play.

I would clearly transfer funds from offensive to defensive and in particular if we are going to have a mobile ICBM like the Midgetman, it makes no sense at all to burden that program with tens of millions of extra dollars because somebody has a theory that a single-warhead missile will induce a change in doctrine on the part of the Soviets. It is without foundation.

Senator WILSON. Thank you very much.

Senator Nunn, have you voted on cloture?

Senator NUNN. No; I have not. I was going to ask two or three questions and then go. I am sure I will not be back.

Senator WILSON. The vote, I gather, is on?

Senator NUNN. Right.

SDI ARCHITECTURE

General Abrahamson, have you stated either sometime in the past or this morning when you expect us to pare down what we call SDI architecture to one, two, or three systems where we can begin looking at them?

Do you have a date in mind to be able to select what I would call an SDI architecture?

General ABRAHAMSON. I think we have a general architecture at this point. There are some things that are still open in that architecture. That is being refined quite clearly.

I think the one most important element I was asked in the Appropriations Committee is when you come back next year, what would you have that would be an important element and that is cost goals associated with each of the elements in the architecture.

I do believe we have a generalized architecture with a few open holes yet, sir.

Senator NUNN. Dr. Yonas, whom I assume is your assistant, General Abrahamson in Defense Week, says there is no baseline architecture. There are many architectures we are looking at.

Mr. PERLE. I think he is overstating perhaps slightly what we are after here.

Senator NUNN. That was coming from another criticism. You are saying you have not——

General ABRAHAMSON. I think we have a basic architecture, that is quite clear. There is still work to be done.

Senator NUNN. I believe someone ought to brief Dr. Yonas on it because he does not believe it.

Also, one of your assistants, and this may not be Dr. Yonas, said 6 or 8 months ago, until we get architecture, we are flying blind. Yet at the same time you are pronouncing SDI as technically feasible.

This morning you backed off that almost completely by saying you are talking about various elements of SDI relating to the hardened ICBM missile.

General ABRAHAMSON. I do not believe I backed off that.

Senator NUNN. How can you pronounce it technically feasible when you are back to the beginning phase of the decision and when your top assistant says you do not have an architecture?

General ABRAHAMSON. You have a good question. Let me put aside some of the statements about the various architectures.

We have selected principal systems to go into those architectures. I showed them as we were there. For example, in directed energy, ground-based lasers, in kinetic energy systems, space-based kinetic kill vehicles and space-based kill vehicles. Those are the general elements of the architecture.

There are still some tradeoffs that are there and there are still some portions that are missing.

Senator **Nunn**. I thought architecture included not just the mechanism for killing missiles, but also sensors and battlefield management.

General **Abrahamson**. That is right. And we have focused on and agreed that there should be an airborne optical adjunct which is an important part of that.

I laid out two satellite systems, the middle range is the altitude satellite system, what we call an SSTS and a synchronous system. Those architectures are general architectures.

Senator **Nunn**. Some people who used the term architecture do not believe you have one yet, including your own people.

Would you submit for the record a list of all SDI payloads prior to the shuttle disaster which had been scheduled to be carried on the shuttle launches in calendar years 1986 and 1987?

General **Abrahamson**. Yes, sir. There is one each major payload and then some small ones.

Senator **Nunn**. Will you provide also for the record the associated cost for each of those experiments, not talking about the cost to NASA if the launch had taken place, but cost attributable to SDI for manufacturing and conducting each of the experimental loads?

General **Abrahamson**. Yes.

[The information follows:]

Fiscal year 1986 SDIO shuttle costs as reflectd in the fiscal year 1987 budget are $89.5M and are still required despite *Challenger* loss.

Budget amounts to provide for tracking and pointing experiments.

TPE #1 flight charges $73M.

TPE #1 integration costs $16M.

Other integration of $0.5M.

Launch costs are requirements to place a payload in orbit.

Integration costs are requirements to adapt a payload into the shuttle bay and peculiar ground support.

TPE #1 flight charges ($68M) paid in January 1986 as fiscal year 1986 requirement to support fiscal year 1987 manifested launch.

Funds are not recoverable from NASA.

SDIO would apply recoverable funds to other high priority efforts.

$5M unpaid flight charges may be applied to increased integration costs due to *Challenger* loss.

Senator **Nunn**. For each calendar year.

General **Abrahamson**. I can give you a quick answer now.

We have one that was scheduled to go in July of this year. That satellite is complete. So, that expenditure has been made. Unfortunately, that will now have to sit by and wait until we have a new option and new opportunity to launch it. It is a scientific, unclassified satellite to understand the upper atmosphere in the infrared and several other frequency wave lengths.

We are continuing to plan that the shuttle will be back in service and we will be given a priority for a 1987 launch. We might slip a few months, but a 1987 launch. We fully expect that we will get that. Therefore, we are continuing to spend the moneys associated with tracking and pointing experiments that will take place then.

Senator **Nunn**. Thank you. I have to leave.

General **Abrahamson**. Thank you, sir.

[Questions for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN WARNER

SDI PROGRAM

Senator **WARNER**. If the U.S. were to emphasize the deployment of an ATBM system, how would this change the structure and content of the SDI program? How would these change if our emphasis was the development and deployment of response options to changes in the threat (i.e., increased Soviet offensive forces or an ABM "creep-out")?

General **ABRAHAMSON**. A U.S. decision to emphasize the deployment of an ATBM system would not change the structure and content of the SDI program. In fact, the SDI program is investigating technologies with potential not only against ICBMs and SLBMs, but is also carefully examining technologies with potential against shorter-range ballistic missiles. Thus, certain technologies being investigated in the SDI program could have application against the shorter-range ballistic missile threats that threaten our allies. If a decision were made to develop and deploy an ATBM system, critical technologies could be selected from the SDI program for early development and deployment.

MATURE TECHNOLOGIES

Senator **WARNER**. What is the relationship within the SDI program between the more mature technologies that could support an early deployment schedule, and those advanced technologies that may be required as growth options to meet a long-term responsive threat?

General **ABRAHAMSON**. SDI is working both near term and far term technologies; the actual difference being the state-of-the-art in those efforts today. In the layered defense-in-depth scenario, a damage denial defense will require several types of target kill mechanisms, some "near-term" and others "far term", to severely complicate the offensive planners' targetting and sizing tasks. Sensor and battle management technologies will evolve as well. The SDI System Architecture Studies are identifying those technologies that will be available first, such as kinetic energy interceptors and passive discrimination techniques, for application into the early phase of an evolutionary BMD system. Other technologies will be available later, such as directed energy concepts and active discrimination technology. The battle management of such a BMD system will be designed so that as new technology is developed, it can be easily introduced into the system, providing more overall capability against the responsive threat.

STRATEGIC DEFENSE DEPLOYMENTS

Senator **WARNER**. How specifically is the SDI program structured to provide options for strategic defense deployments in response to changes in the threat-like increased Soviet offensive forces, or an ABM break-out or "creep-out"—prior to the early-1990's decision point for more comprehensive defenses?

General **ABRAHAMSON**. The SDI program at present is not structured to provide deployment options for strategic defenses between now and the early 1990's. This is in concert with the Fletcher Study recommendations. The SDI Program has several direct ties with the intelligence community that input potential and actual Soviet force structure changes to the program, primarily in the developing Systems Architecture Studies. Those studies are being designed against the most severe threat and countermeasure possibilities. A near-term response to a Soviet "creepout" or breakout of the ABM treaty, would have to be based on the few technologies that have been shown to be mature in demonstration and validation experiments conducted so far. These technologies include the Sprint and Spartan technologies of the Safeguard era-both of which are nuclear-warhead technologies—and the Homing Overlay non-nuclear experimental intercept of 1984. These technologies are not as effective as new, emerging SDI defense technologies would be but would, of course, be available sooner. The entire SDI program is structured to shorten the time until the more effective defenses could be available. We are bringing the new technologies along as rapidly as SDI Program budgets will permit, pursuing demonstrations and validation of these technologies, so that we will have the greatest possible selection of system approaches from which to choose if and when a deployment decision is made.

SDI AND ANTI-TACTICAL BALLISTIC MISSILE SYSTEM

Senator **Warner**. Would you identify for us the specific activities within the Strategic Defense Initiative program that are developing the technologies required for an anti-tactical ballistic missile system?

General **Abrahamson**. The System Architectures Studies have already identified first-order theater architectures to deal with the tactical missile threat. Further, the Systems Directorate will soon launch a competitive contractual effort, open to the Allied as well as U.S. contractors, to further define technological and system requirements for the ATM mission. The U.S. Army has been given the lead in the execution of that effort for SDI. The SDI Multinational Affairs Office will handle the programmatic interfaces with the allied participation in SDI. Sensor and battle management requirements for ATM may share some SDI-type technologies, but the parameters within which the ATM defense must operate will make the system quite different from a global defense against ICBMs. Many of the kinetic energy interceptor technologies that may be used in an ATM system are incorporated into the current SDI program. Just as the global architectures studies have identified key technology issues for global BMD, so the theatre architecture will help identify and channel ATM technology efforts.

ALLIED PARTICIPATION IN SDI

Senator **Warner**. Would you provide for the subcommittee, in unclassified form, an overview of the terms under which our allies are being invited to participate in the SDI program?

Mr. **Perle**. Our objective is to permit allied firms to compete on an equal basis with U.S. firms for SDI research contracts, insofar as that is permitted under our laws, regulations and international obligations (including the ABM Treaty), and to help us to accomplish SDI objectives as early as possible, with work of the highest quality and at the lowest cost.

All allied participation will be on the basis of technical merit. There will be no set-asides or guarantees of research work. Sole-source awards may be made where unique allied capabilities exist, but most contracts will be granted through competitive procurement.

Depending on allied government interest and technical capability, we may undertake jointly-funded cooperative research projects, pursuant to the Quayle amendment, DOD Authorization, and other relevant legislation. Such projects would be the subject of bilateral Memoranda of Agreement rather than contracts.

U.S. and allied firms may agree on partnerships, joint ventures, and/or subcontractual arrangements. Those will result primarily from private enterprise decisions and are neither discouraged nor encouraged in the bilateral MOU's.

Questions Submitted by Senator Strom Thurmond

SDI DEPLOYMENT

Senator **Thurmond**. Mr. Perle, in a recent statement reported in the Washington Post, Dr. Henry Kissinger, a principal architect of the 1972 Antiballistic Missile Treaty, said regarding SDI that, "We ought to bite the bullet and say we are going to deploy . . . if the Soviets had the ability to build their own SDI you can bet your last cent they would do it." How would you respond to his comments?

Mr. **Perle**. We are conducting the SDI program to determine the feasibility of developing and deploying effective defenses against ballistic missiles, defenses that will have a stabilizing impact on the U.S.-Soviet balance and that will discourage the Soviet Union from continuing to build up their arsenal of offensive ballistic missiles. If such defenses prove feasibile, they could make a very useful contribution to deterrence and stability. It would be difficult to dispute Dr. Kissinger's observation that the Soviets would deploy SDI-type defenses if they had them. Defenses always have played an important role in Soviet military doctrine. This is reflected in the fact that fully half of their strategic military budget is devoted to defensive forces, including ballistic missile defenses and air defenses.

DEPLOYING STRATEGIC DEFENSES

Senator **Thurmond**. General Abrahamson, what specific actions are being taken to reduce lead times in the event that a decision to deploy strategic defenses is made?

General ABRAHAMSON. The entire SDI Program by charter, is designed to reduce the lead time after a deployment decision. The technology efforts are structured to advance the most promising technologies in sensors, directed energy concepts, kinetic energy concepts, and battle management/command and control, making them available as soon as possible within the restrictions of the ABM Treaty. The SDIO has pioneered advances in procurement strategy, notably the "horserace" concept where the competition is judged on (1) best proposal for price, (2) speed of performance and (3) quality of that performance. This has been very effective in our Systems Architecture Studies, providing quality results in months, rather than years as was the norm before SDI. Specific efforts are underway in the logistics, supportability, maintainability and cost effectiveness arenas to make future deployment of potential systems as efficient as possible.

SDI TECHNOLOGIES

Senator THURMOND. Would either or *both* of you comment on the issue of the offensive potential of SDI technologies?

Mr. PERLE. Our fundamental objective under the SDI research program is to seek better ways to ensure U.S. and Allied security using the increased contributions of defenses—defenses that threaten no one. While it is difficult to be certain of capabilities of potential systems based on technologies not yet developed, defenses based on the new technologies we are investigating would not have offensive roles.

Creating effective defenses that could make ballistic missiles obsolete would require systems highly optimized for this purpose, making them unsuitable for offensive purposes. Effective offensive weapons, such as ballistic missiles, already exist; the point of SDI is to find defenses against ballistic missiles, not to augment their offensive capabilities.

MX VERSUS SMALL ICBM

Senator THURMOND. Mr. Perle, would it be more cost effective to deploy 100 MX missiles in superhard silos with a ballistic missile defense overlay rather than say, 500 small mobile ICBM's in hardened launch vehicles?

Mr. PERLE. Before the United States begins a commitment to the deployment of ballistic missile defenses, such as the defense of the Peacekeeper/MX, it is necessary to establish that we will be able to maintain their effectiveness into the future against conceivable Soviet countermeasures. This is the purpose of the SDI Program. In the meantime, passive measures, such as mobility and silo hardening, must be taken to enhance the survivability of our retaliatory forces. At such time that the United States, in consultation with our allies, decides to develop and deploy an effective defense against ballistic missiles, these measures also will have the effect of ensuring the stability of the transition period. Thus, it is important that we not make an artificial distinction between silo hardening and mobility on the one hand, and ballistic missile defense on the other. These measures are inextricably linked.

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

ABM TREATY

Senator LEVIN. Are you a member of, or aware of, a review or advisory panel in the DOD that evaluates the desirability of our present policy of adhering to the original interpretation of the ABM Treaty.

Mr. PERLE. As a matter of course, the Department of Defense has always examined the implications of U.S. treaty commitments for our national security. The ABM Treaty is no exception. Consequently, the Department is reviewing the national security implications of the broader interpretation of the ABM Treaty.

SDI TECHNOLOGY

Senator LEVIN. Have you made any recommendations to General Abrahamson on the conduct of his research activity? Have you recommended to General Abrahamson that he conduct any demonstrations of SDI technology?

Mr PERLE. The SDIO has been directed by the President to conduct the program in accord with the provisions of the ABM Treaty. Technology demonstrations are a part of this program, and are being planned to remain consistent with the ABM Treaty.

ABM TREATY

Senator **Levin**. Was Judge Sofaer's opinion on the ABM Treaty reviewed by you or discussed with Judge Sofaer prior to Mr. McFarlane's television appearance on October 6, 1985?

Mr. **Perle**. No.

SALT II LIMITS

Senator **Levin**. Should we continue our policy of not undercutting the SALT II limits on strategic nuclear delivery vehicles?

Mr. **Perle**. The President has announced that the United States cannot continue to support unilaterally a flawed SALT structure that Soviet noncompliance has so grievously undermined and that the Soviets appear unwilling to repair. Therefore, in the future, the United States will base decisions regarding its strategic forces on the nature and magnitude of the threat posed by the Soviet Union, rather than on standards contained in the expired SALT agreements unilaterally observed by the United States.

SPACE BASED DEFENSIVE SYSTEMS

Senator **Levin**. If the Soviets want to develop and deploy space-based defensive systems, why do you believe they are willing to agree to ban such development and deployment?

Mr. **Perle**. The ABM Treaty already bans development, testing or deployment of space-based ABM interceptor missiles, ABM launchers and ABM radars. During the negotiations of the Treaty, the United States attempted to win Soviet acceptance of similar constraints on ABM systems based on other physical principles, including devices capable of substituting for ABM interceptor missiles, launchers or radars. Since the Soviet Union steadfastly resisted that effort, Agreed Statement D provides only that "specific limitations on such systems and their components would be subject to discussion in accordance with Article XIII and agreement in accordance with Article XIV of the Treaty."

Soviet research and development on both traditional and advanced technologies for defense against ballistic missiles was in no way slowed down by the ABM Treaty. On the contrary, it actually increased. The USSR appears to be preparing a nationwide ABM defense and has long had a substantial research program in the same technologies being examined under the Strategic Defense Initiative research. The USSR has invested far more plant, capital and manpower in its research on advanced defenses against ballistic missiles than the United States has in the SDI.

The Soviet aim is to persuade the United States to abandon our Strategic Defense Initiative research. The USSR would almost certainly not comply with any ban on such research, but might urge it, knowing that it was not verifiable and that the United States would abide by it. If the U.S. abandoned the SDI, the Soviets could hope eventually to achieve the uncontested first strike capability they have long sought, by adding a monopoly on advanced defenses against ballistic missiles to their existing monopoly on traditional ABM systems, overwhelming preponderance in air and passive defenses, and qualitative and quantitative superiority in offensive forces.

ABM TREATY

Senator **Levin**. You testified that it was not rational, in the long term, to adhere to the restrictive interpretation of the ABM Treaty. Is that the administration position or yours?

Mr. **Perle**. My personal view of this issue is that, ultimately, the Congress is not likely to support any decision in the future to develop and deploy defenses against ballistic missiles unless it can be demonstrated to their satisfaction that they can be effective. Because most members of Congress and their constituents are not technical experts, I believe they probably will insist on clear and graphic demonstrations of defense effectiveness that go beyond the confines of the restrictive interpretation of the ABM Treaty.

SDI TESTS AND EXPERIMENTS

Senator **Levin**. Which SDI tests or experiments would require U.S. adherence to Judge Sofaer's reinterpretation of the ABM Treaty?

Mr. **Perle**. In the past, Administration statements held that the ABM Treaty prohibition on development, testing, and deployment of sea-based, air-based, space-based, or mobile land-based ABM systems, or components for such systems, comes into effect when such ABM systems or ABM components enter the field testing stage. Following a US government review in October 1985 of the ABM Treaty text and negotiating record, the President concluded that a broader interpretation is fully justified. Under this broader interpretation, the U.S. could pursue the testing and development of ABM components based on other physical principles without violating the ABM Treaty.

The SDI research program was originally structured in a manner that was designed to permit it to achieve critical research objectives while remaining consistent with a more narrow interpretation of the ABM Treaty. This being the case, in October 1985, the President determined that, while he reserves the right to do otherwise, it was not necessary to restructure the SDI program towards the boundaries of Treaty interpretation which the U.S. could observe. Thus, all SDI tests and experiments are currently structured to be consistent with the more narrow interpretation of the treaty.

ABM TREATY

Senator **Levin**. You testified we made it clear to the Soviets that they are free to follow the broader interpretation of the ABM Treaty even though we are following the restrictive version. When did we notify them of that?

Mr. **Perle**. During the ABM Treaty negotiations the Soviets rejected our attempts to achieve agreement on the more restrictive interpretation. As a result, the Soviets have always been free to follow the broader interpretation. In this situation there has been no need to "notify" the Soviets of our views. However, our views about this matter have been made clear to the Soviets on several occasions since the President's determination in October 1985 that the broader interpretation is fully justified. For example, the President's decision was set forth publicly in Secretary Shultz's address to the North Atlantic Assembly in San Francisco on October 14, 1985.

SHARING SDI RESEARCH

Senator **Levin**. Is there any reason why our agreements relative to SDI with foreign countries should not be made available for congressional oversight?

Mr. **Perle**. The Memoranda of Understanding (MOU) on cooperation in SDI research which we sign with other countries are routinely provided by the State Department to the Chairman of the Senate Foreign Relations Committee and the House Foreign Affairs Committee.

SOVIET NUCLEAR WEAPONS

Senator **Levin**. Is the USSR ahead of us in reliability, safety, and size versus yield characteristics of their nuclear weapons?

Mr. **Perle**. While intelligence information on Soviet nuclear weapon design is limited, I can make a few observations that support our belief that their weapons differ significantly from U.S. systems. One of the prime reasons driving this belief is that each side must place at risk a unique target base. In that regard, the U.S. faces a greater challenge because the Soviet target base has continued to grow and at the same time has undergone a significant increase in hardness.

I would also observe that Soviet weapons are not limited in size and weight, thus making their designs far less dependent on critical performance parameters and physical relationships in order to achieve predictable and reliable yields. To put it another way, U.S. weapons are probably smaller than Soviet weapons for a given yield. The U.S. achieves this performance through a greater dependence on miniaturization and other high technologies.

Reliance on technology has its drawbacks. It causes a greater dependence on testing to ensure safety and reliability. Moreover, the U.S. builds safety and security into its weapons, again brought about through technology. On the Soviet side, they use the policy powers of the State to ensure the safety of their warheads from unintended use; thus they avoid still other weapon system complexities.

SDI PROGRAM

Senator **Levin**. Last July, I submitted questions to Mr. Donald Hicks about the SDI program, including a request for the definitions of component, subcomponent, field test and laboratory research. The definition of component which Mr. Hicks supplied was technically inaccurate, since it implied that components are only those mentioned in Article II of the ABM Treaty, when in fact Article II uses the words "currently consisting of" before listing missiles, radars and launchers as components of an ABM system. Mr. Hicks did not even attempt a definition of subcomponent, even though this distinction is critical to the argument that various aspects of SDI do not violate the ABM Treaty. Your 1985 Report to the Congress uses the term, for example on p. B5, so you presumably have a definition. What is your definition of a subcomponent?

General Abrahamson. Neither the ABM Treaty nor the relevant negotiating record refer to the term subcomponent. For any device to be limited by the Treaty, it must constitute an ABM system or component (an ABM interceptor missile, ABM launcher, ABM radar), or a device capable of substituting for such an ABM component. Consequently, the term subcomponent does not refer to devices limited by the Treaty; rather, it is meant to describe a class of devices which, because of limitations in the extent or breadth of their functions, do not constitute components.

While "ABM system" in Article II, paragraph 1, can reasonably be read to mean more than just the particular systems in existence when the Treaty was signed, it cannot readily be read to encompass those future systems or components based on physical principles other than those used at that time. The phrase is most reasonably read to include, in addition to current systems and components, those that could be developed through the application of then-utilized physical principles, but not those systems or components that could be developed only by resort to "other physical principles."

ABM TREATY

Senator Levin. Mr. Hicks also did not answer my question about the definitions of laboratory research and field testing. He said the terms were not used in the ABM Treaty. Your 1985 Report to Congress on p. B4 quotes from Gerard Smith's testimony to this committee in 1972 which uses both of these terms. How do you define these terms?

General Abrahamson. Neither laboratory research nor field testing are terms used in the ABM Treaty. However, "laboratory testing" and "field testing" are terms used in discussions within the U.S. Government to clarify the distinction between research, which is not limited by the ABM Treaty, and development, which is limited in certain ways by Article V of the Treaty.

In research we include such activities as "laboratory testing," which is partly characterized as taking place under a roof or in some other location protected from the outside. "Field testing" is partly characterized as taking place outside or in the open. The fact that laboratory testing would pose problems for verification by National Technical Means is an important consideration in the distinction between the terms "laboratory testing" and field testing."

STAR AND BEACON PROJECTS

Senator Levin. Please supply a complete list of all Star and Beacon projects with their respective costs to complete schedule milestones, and the technical capabilities which you intend to demonstrate with each.

General Abrahamson. The list of major experiments (Star + Beacon Experiments) is attached below. The list refers to the Report to Congress on the SDI (RC) dated March 1986, giving the pages on which the experiments are described. The description includes the technical objectives of the experiments and schedule milestones. Costs to complete the experiments are presented in the table for the year 1987 and for the collective years before 1987 to 1992. Experimental costs are estimated as part of a larger budget item that includes technical development that is used in other parts of the program.

ATTACHMENT

[RC-Report to Congress]

Experiment	Description	Schedule	1987	1987-91
BSTS	B15	B28	165	1,821
SSTS	B17	B28	122	1,927
AOA/AOS	B18	B28	99.1	508
TIR	B20	B28	94.6	386
SATKA/Systems	B21	B28	178.3	983
GBL FEL	C7	C15-16	474	1,968

ATTACHMENT—Continued

[RC-Report to Congress]

Experiment	Description	Schedule	1987	1987-91
NPB Interactive Discrimin	C9	C15–16	143	728
Space ATP	C10	C15–16	94	2,643
Endoatmospheric (HEIDI)	D12	D28	121.5	1,128
Exoatmospheric (ERIS)	D14	D28	106.9	1,380
Integrated hypervelocity	D15	D25	63	625
SBKVV	D17	D25	156.4	1,397
HWIL	D19	D25	31.9	213
KMR	D20	D25	45.1	251
STM	D23	D25	151	295
BM/C^3	E6	E17	121.8	1,169
HTB	E14	E17	76.5	778
SP100	F5	F10	50	8,246

KINETIC ENERGY WEAPONS

Senator LEVIN. In your budget request under Kinetic Energy Weapons, Project 0023 titled "Significant Technical Milestone" has no description at all. What is this project, and what will its total cost be?

General ABRAHAMSON. Two test activities are covered by Kinetic Energy Weapons Project 0023, "Significant Technical Milestone." The second is a Special Access Program. Both operations involve the use of delta launch vehicles to place spacecraft into orbit for purposes of collecting observation data relevant not only to Kinetic Energy programs but to the entire SDIO program. Cost for the two operations now covered by Project 0023 is $274.7M (FY85–88).

SDI FUNDING

Senator LEVIN. What level of funding is required in fiscal year 1987 to maintain the same level of effort in SDI research that was underway in fiscal year 1986?

General ABRAHAMSON. It is estimated that approximately $4.1 billion is required to maintain the level of effort begun in fiscal year 1986.

STRATEGIC DEFENSE SYSTEMS

Senator LEVIN. The system architecture studies you contracted for in 1985 examined strategic defense systems with varying levels of effectiveness. What level of effectiveness do you consider necessary for the SDI program to be able to achieve in order to be able to recommend to the President and the Congress that a system be deployed?

General ABRAHAMSON. The effectiveness requirement for a potential BMD is only a part of the decision process that will take place. Putting an "effectiveness specification" on a potential BMD system in isolation of the other applicable factors would be meaningless. It is analogous to putting an effectiveness specification on an offensive system before building it and without analysis of the defenses it would face or its overall role in the force structure. As has been briefed to the Senate, there are two missions for a potential BMD system. The ultimate goal is a damage-denial, there is the direct contribution that BMD would provide to deterrence: adding such uncertainty to the offensive planner's attack strategy that the probability of a successful attack would be too low, or require too much offensive resources, to be of any utility, even in a crisis. The charter of the SDI Program is to conduct a comprehensive research program, within the constraints of the ABM treaty, to answer the technical side of what is a technical and political/military question: How effective and survivable a BMD system can we build, and will that proposed system add enough to the deterrent posture to justify its development and procurement? That is the crux of any Full Scale Engineering Decision (FSED). Whether or not that initial effectiveness number, be it 50%, 75% or 99.99%, is acceptable is only a part of the overall deployment decision process. Other questions that must be answered are:

How fast and how well can the BMD system evolve to meet the responsive threat?

How does this BMD system integrate with other military forces to provide a comprehensive deterrent?

How do arms control, offenses and defenses fit into the overall strategic balance?

What is the Soviet strategic force makeup at the time of the FSED decision and what are the future trends?

The Administration and Congress at that time will no doubt have other budgetary, policy and military concerns that will be germane. The charter of the SDI remains to develop the technology in order to provide the best and highest fidelity answer possible for this overall decision.

ABM TREATY

Senator LEVIN. If you were told to follow the broader interpretation of the ABM Treaty, would you do anything different in fiscal year 1987 from what you are planning? Please detail the cost, schedule and technical implications of continued compliance.

General ABRAHAMSON. It is too early to make such a determination. Such questions are currently under review.

AOA EXPERIMENT

Senator LEVIN. You have stated that AOA experiment do not violate the ABM Treaty because of sensor and platform limitations. Are the limitations artificial and maintained solely for complying with the treaty? How quickly could these limitation be overcome and the AOA be tested as an ABM component?

General ABRAHAMSON. The AOA Limitations are not artificial, but real. The objective of the AOA program is to demonstrate function performance in acquisition, discrimination, track and handover. This will lead to a design data base for long wave infrared sensors which must operate from an aircraft platform. While the AOA experiment provides this necessary data base, it would require improvement in the following areas in order to be able to perform ABM functions: [Deleted.] These actual limitations could not be overcome for the AOA to be tested as an ABM component.

Senator LEVIN. Can the AOA device with which you are experimenting be developed without violating the "narrow" interpretation of the ABM Treaty?

General ABRAHAMSON. The AOA experiment has been designed and the AOA experimental device is being developed within the "narrow" interpretation of the ABM Treaty.

BSTS DEVICE

Senator LEVIN. Can the BSTS device with which you are experimenting be developed without violating the "narrow" version of the ABM Treaty.

General ABRAHAMSON. Yes. [Deleted.]

SOVIET COUNTERMEASURES TO SDI

Senator LEVIN. Who is in charge of our "Red Team" program relative to Soviet countermeasures to SDI?

General ABRAHAMSON. Dr. Keith Taggart is the Director of the SDIO Countermeasures Office.

SDI FUNDING

Senator LEVIN. How many dollars were obligated in each of the first two quarters of fiscal year 1986 for the SDI program? What are the expected obligation totals for the third and fourth quarters?

General ABRAHAMSON. 1st quarter fiscal year 1986 $437 million; 2nd quarter fiscal year 1986 $1,153,000; 3rd quarter fiscal year 1986 estimate $765 million; 4th quarter fiscal year 1986 estimate $342 million.

Senator LEVIN. A member of your staff recently supplied an estimate of the total cost of the SDI program which was significantly higher than the entire Function 050 budget request for national defense. At least one contractor conducting system architecture studies has made a total system cost estimate. Please supply both of these estimates and any others which have been produced for your office. In what year do you believe you will be able to provide reliable rather than estimated cost estimates for development and deployment of SDI systems?

General ABRAHAMSON. No estimates have been done on total cost. It is impossible to estimate with any accuracy the total cost of a system not yet designed. The referenced member of the SDIO staff was engaged in an informal discussion based upon hypothetical situations and architectures and in no way either represents an estimate or a DOD position.

It is our hope to provide estimates for specific cost goals associated with the research within the next year.

SDI TECHNOLOGY

Senator LEVIN. Please list any projects that you have planned this year to demonstrate SDI technology.

General ABRAHAMSON. I have listed several examples of the projects we have planned to demonstrate SDI technology this year. A much more detailed list of the projects is included in the classified SDI Report to Congress. Among the projects scheduled for this year are: Cobra Judy data collection; Optical Airborne Measurement Program; Queen Match data collection; FEL testing at LLNL; Laboratory testing of HEDI IR seeker; Lethality testing against hardened targets.

Again a very detailed breakdown of the various projects is included in the classified SDI Report to Congress.

RESEARCH EFFORTS BY SDIO

Senator LEVIN. In terms of your original expectations of success of the various research efforts conducted by the SDIO, please list the research programs in order from most successful to least successful. Please define the criteria used in ordering the programs.

General ABRAHAMSON. I feel it is much too early in the SDI research program to judge successes in particular technology programs. The Fletcher Commission traced out technology roadmaps for sensor, battle management and target kill technologies in 1983, choosing the best and most promising technologies; so far, there are no technology efforts that are not progressing at least as fast at the Defense Technology Study Team (DSTS) projected. Some technology efforts have been scaled back due to austere funding levels, that is my biggest disappointment to date. Some technologies, such as the free electron lasers, have been accelerated due to spectacular advances that have put them years ahead of the DTST predictions. Nevertheless, budgetary restrictions have required painful decisions between several promising technical alternatives years ahead of where I would have wanted those decisions made, thus increasing the technical risk of the program.

NUCLEAR PORTION OF SDI

Senator LEVIN. You characterized the nuclear portion of SDI as a "small percentage". If the question is limited to funding for weapons designed to destroy ballistic missile boosters or RVs in flight, what percentage of this research total would be nuclear?

General ABRAHAMSON. In the past, funding for nuclear-driven directed energy weapons (NDEW) has been approximately 10–15 percent of the total SDI budget. The Department of Defense and the Department of Energy are seeking increased funding for NDEW research just as the Administration is also seeking increased funding for the overall SDI research program. The NDEW program, however, will not exceed its usual proportion of the SDI budget.

SOVIET NUCLEAR DEVELOPMENT

Senator LEVIN. In view of your comments and concerns over Soviet nuclear development, would not a mutual agreement to cease nuclear weapons tests be to our advantage?

General ABRAHAMSON. A comprehensive test ban continues to be a long-term objective of the United States in the context of achieving broad, deep and verifiable arms reductions, substantially improved verification capabilities, expanded confidence building measures, a greater balance in conventional forces, and at a time when a deterrence based on strategic nuclear forces is no longer as essential an element as currently for international security and stability.

COSTS/DEFENSE OVER OFFENSE

Senator LEVIN. Do preliminary cost estimates for SDI favor defense over offense?

General ABRAHAMSON. It is too early in the Strategic Defense Initiative research program to speculate on the precise cost of any future system of defenses against ballistic missiles. It is important to note that one of our key criteria for judging the effectiveness of such a system is that it provide strong disincentives to any efforts to overwhelm it with additional offensive forces. This criterion is couched in terms of cost-effectiveness. However, it is much more than an economic concept. In addition, by significantly reducing or even eliminating the military utility of ballistic missiles, effective defenses would provide a powerful impetus to progressively deeper negotiated reductions in offensive nuclear arms. Thus, the long-term financial cost of a system of defenses against ballistic missiles could be considerably lower than that required to maintain a deterrent based almost solely on the threat of retaliation by offensive nuclear forces. Furthermore, the relative costs of deterrence founded primarily on offensive systems obviously should not be measured in financial terms alone. The prospect of a world free from the threat of nuclear weapons is certainly worth a substantial initial investment.

SDI AND ABM TREATY

Senator LEVIN. What part of the SDI program do you believe will be the first to "bump up" against the "narrow" interpretation of the ABM Treaty?

General ABRAHAMSON. The program has been structured to be consistent with the restrictive interpretation of the ABM Treaty. To maximize the efficiency of the program under these conditions, no single part of the program has been planned in a manner to reach the limits of the Treaty significantly before all other parts.

QUESTIONS SUBMITTED BY SENATOR EDWARD M. KENNEDY

BALLISTIC MISSILE DEFENSE

Senator KENNEDY. How specifically, does the SDIO plan to assess whether a ballistic missile defense system will meet the effectiveness, and its contribution to stability?

General ABRAHAMSON. The SDIO will provide the technical foundation which will enable the Congress and the President to make an informed decision in the early 1990s on whether to deploy strategic defenses.

FUNDING PRIORITIES

Senator KENNEDY. General Abrahamson, your funding priorities seem to have changed considerably in fiscal year 1986, and again in the 1987 request. For example, chemical lasers are now being downfunded as your emphasis seems to be shifting toward free electron and other types of lasers and directed energy weapons. Why should Congress agree to this year's massive increases in funding if the priorities are going to change from year to year?

General ABRAHAMSON. The SDI funding is based on a logical research program designed to answer the question of feasibility of a ballistic missile defense. Since it is a research program it is only prudent to pursue more promising technologies as they evolve. We have been forced to curtail some promising technologies due to funding reduction made during the last two years. The SDI has not changed priorities; it has simply been forced to restructure the program based on severely reduced fundings. Failing to provide adequate funding this year will only compound the situation.

EASTPORT STUDY

Senator KENNEDY. General Abrahamson, can you tell us how the Eastport Study's conclusions on potential problems with any SDI software architecture have been factored into the overall SDI architecture studies, especially any redirections? Did that study's conclusions have any effect on the survivability program, specifically judgements about any strategic defense system's vulnerability to electronic countermeasures?

General ABRAHAMSON. The SDIO has recently received the report of the Eastport Study Group, the panel from industry, government and academia that was appointed "to devise an appropriate computational/communications response to the (strategic defense battle management) problem and make recommendations for a research and technology development program to implement the response."

The essence of the report is captured by the following quote from it:

"The panel concludes that computing resources and battle management software for strategic defense systems are within the capabilities of the hardware and software technologies that should be developed within the next several years. However, the anticipated complexity of battle management software and necessity to test, simulate, modify, and evolve the system make battle management and command, control and communication (BM/C^3) the paramount strategic defense problem."

To address this issue the report offers a research strategy that emphasizes the interaction of BM/C^3 with system architecture. In this vein, the panel assesses that:

"Software technology is developing against inflexible limits in the complexity and reliability that can be achieved. The tradeoffs necessary to make the software task tractable are in the system architecture. As indicated in the Fletcher Report, the 'applique approach' of designing the system first and then writing the software to control is the wrong approach for SDI. System Architecture and Battle Management must be developed together."

With this perspective, a number of specific observations and recommendations are made relative to technology research in computing software, processing hardware, and in communications. The innovations and potential payoff of the recommended approaches are recognized. Where appropriate the SDIO will augment its BM/C^3 technology research to incorporate the recommended steps, even as the SDI seeks innovation from all quarters and from all technologies.

The SDIO endorses the spirit and content of the report of the Eastport Study Group. It is found to be in harmony with the needs of the SDI program and its rapid implementation shall be pursued throughout the R&D effort.

SDI "THINK TANK"

Senator **Kennedy**. General Abrahamson, what is the rationale for the proposed SDI "think tank?" Why do we need to fund a think tank devoted exclusively to SDI? Wouldn't such an institution, funded and established through your organization, be a captive of the SDIO?

General **Abrahamson**. The rationale for the proposed SDI institute was based upon an assessment of government organizations and contractor resources which yielded the following conclusions:

The use of a government organization to provide the special technical support needs of the SDIO was found undesirable for two main reasons: it would be difficult to attract, retain, and manage the required number of highly qualified scientific and engineering personnel; and the needed personnel buildup could not occur sufficiently rapidly, nor respond sufficiently quickly to changing requirements.

The use of for-profit firms was found to be undesirable because of the conflicts of interest inherent in the for-profit organization approach; the probable inability to ensure total objectivity and independence of thought; and the negative business impact on such a firm through its necessary dedication to SDIO technical support alone.

Of the various not-for-profit alternatives examined, a new FFRDC ranked highest. The FFRDC mechanism was considered to offer quick, responsive handling of SDIO needs, while allowing considerable freedom in establishing salary structures and working environments conducive to attracting top scientific and engineering talent. While reliance on an existing FFRDC or other non-profit organization potentially would provide more readily or more quickly available capability and staff, none was found to have the breadth of specialized expertise to undertake major SDI technology program review and oversight. Any existing organization, including an existing FFRDC or national laboratory will have ongoing work, and a deeper background, in one technology or another. Nor would any organization already in existence be in a position to offer the desired degree of dedication of, and exclusive focus on, the SDI program. The establishment of a new FFRDC, specifically oriented to SDIO technical support needs, was found to be likely to result in materially greater responsiveness and support than trying to reorient an existing FFRDC.

NUCLEAR ASPECTS OF SDI

Senator **Kennedy**. The press seems to run almost daily reports giving conflicting information on how much of the SDI effort is nuclear related. Could you give us a brief overview of the nuclear aspects of the SDI program and how they relate to the overall SDI effort?

Please also provide for the record funding devoted to the nuclear driven directed energy program as a percentage of the overall SDI budget (DOD and DOE) for fiscal year 1986-88.

General **Abrahamson**. As stated by the President, the focus of the Strategic Defense Initiative program is to examine nonnuclear means for rending ballistic missiles obsolete. We have adhered to this guidance and have witnessed several accomplishments that give us confidence that the possibility of employing a nonnuclear ballistic missile defense system is very real. However, we are also exploring concepts which would use nuclear energy to power devices that could destroy ballistic missiles and warheads at great distances. This work is necessary to understand the potential impact of any similar system the Soviets might develop, as well as to determine the feasibility of these concepts for future SDI options.

This reflects the enormity of the SDI task. Not only must we examine the feasibility of developing a system that could accomplish stated goals, we must also examine the potential Soviet threat and possible Soviet countermeasures to any system under consideration.

PROJECTED SOVIET THREAT

Senator KENNEDY. General Abrahamson, I understand that considerable effort has been directed on both Phase I and Phase II of the architecture studies toward analyzing the projected Soviet threat to any U.S. strategic defensive system. Have your projections of the anticipated Soviet strategic offensive force in the 1990's and into the year 2000 changed as a result of those studies? Is the projected threat greater or less than you initially projected?

General ABRAHAMSON. The architecture studies are provided a baseline threat which is developed by an SDIO intelligence working group. The threat is based on the best available intelligence data as to how the Soviets are likely to respond. The data is periodically reviewed and the threat is subject to change when indicators so dictate. On the other hand, the architecture teams are free to examine threat excursions to determine how robust the architectures would be to variations in the threat. These threat excursions are based on what the specific architecture team feels the Soviets could do. It is prudent to attempt to design an architecture which can handle excursions; however, an excursion is not a basis for changing the baseline threat.

SOVIET STRATEGIC WEAPONS

Senator KENNEDY. General Abrahamson, have we discerned any changes in the Soviets' strategic offensive weapons programs as a result of the SDI program?

General ABRAHAMSON. The length of time taken for the Soviets to make changes in their strategic offensive weapons programs is comparable to the time it takes the United States to change its weapons from requirements definition through testing and deployment. Because the United States has not yet made a decision on whether or not to deploy an SDI, and if so, what the system would consist of and in light of the fact that the SDI program is only three years old, it is too early to see changes to Soviet weapons programs that could be considered responses to the SDI.

REMOVING SDI FROM PUBLIC AND CONGRESSIONAL SCRUTINY

Senator KENNEDY. General Abrahamson, is the Strategic Defense Initiative being removed from public and congressional scrutiny? Is the classification of the recent GAO report on the SDI's finances and management structure the first step in that process? Why was that report, based entirely on unclassified information, classified? How do you justify such a decision to keep information from the American people at a time when you are giving briefings to Soviet officials that reveal certain classified information?

General ABRAHAMSON. The Strategic Defense Initiative is not being removed from public or congressional scrutiny. The upgraded classification of the GAO report on Financial and Management Structures of the SDIO to SECRET was announced after a thorough review of the contents revealed that the resulting product compiled a sensitive and unique perspective on the Strategic Defense Initiative Organization.

When it was founded, the SDIO made an organizational commitment to present the Congress and community with a forthright assessment of the present threat environment and our ability to effect a positive return to stability. We have not deviated from this commitment. It is not in the best interest of the nation as a whole, or the SDI as a program, to close off the flow of information. It is, after all, ultimately the Congress and public that will make the decision to proceed or not with the SDI. As I am sure you will agree safeguarding national security must always be a top priority. It must not be an issue to be taken lightly. In the case of the GAO report prudent judgment dictated that it be classified SECRET.

NUCLEAR AND SPACE TALKS

Senator KENNEDY. General Abrahamson, what is the real story concerning news reports that, in your appearance at the nuclear and space talks in Geneva, you divulged classified information to Soviet negotiators? Are these reports, in part made public by one of your own assistants, accurate?

General **Abrahamson**. The meetings which took place between myself and Soviet negotiators in Geneva were classified because any and all discussions related to the negotiations are treated as confidential. Absolutely no secret information on the SDI was given to the Soviets.

NO GROWTH IN DEFENSE SPENDING

Senator **Kennedy**. Secretary Perle, we here in the Senate need your help. The Senate Budget Committee has just approved a budget that would mean no growth in defense spending for fiscal year 1987. If we are to approve funding in fiscal year for a 75 percent increase in spending for SDI, something else will have to go. What programs should we cut from the defense budget to cover the $2 billion increase in SDI funding?

Mr. **Perle**. The determination of the level and mix of funding necessary to meet our security requirements is a difficult and complex task. It involves making difficult decisions, trying to balance such competing concerns as our needs for conventional versus nuclear weapons and needs for weapon research versus weapon procurement. I believe the appropriate balance between these various factors and the level of funding that best protects our national security are those in the budget request submitted by the President. I am also convinced that the SDI program is a worthwhile investment for our defense dollars. Given the importance that the Soviet Union attaches to the development and deployment of defensive forces including technologies similar to our own SDI program and the potential contribution that strategic defenses can make to deterrence, pursuit of this research is a prudent and necessary investment.

ELIMINATING NUCLEAR WEAPONS

Senator **Kennedy**. Secretary Perle, you have been quite critical of Soviet leader Gorbachev's plan to eliminate weapons by the year 2,000. The President says that he shares Gorbachev's stated objective of eliminating nuclear weapons, although he has a different scheme for achieving this goal. Leaving aside, for the moment, the feasibility of either leader's plan, do you believe that the United States would be more or less secure if nuclear weapons were eliminated in the next fifteen years?

Mr. **Perle**. Our ultimate goal of a nuclear-free world is not an end in itself, but instead a means to ensure long-term stability and security for the world, free from the threat of devastating conflict. For the near term, we must continue to rely on the threat of retaliation with offensive nuclear forces to deter aggression against both the United States and our allies, just as we have done so successfully for the last four decades. Under the Strategic Defense Initiative, we are examining the feasibility of shifting over the long term to deterrence based increasingly on defensive systems. By depriving ballistic missiles of their military utility, fully effective defenses would provide a powerful incentive to progressively deeper negotiated reductions in those forces and eventually their complete elimination. In order to be able to eliminate all nuclear weapons, we will have to concentrate as well as defenses against, and reductions in, non-ballistic nuclear threats. Finally, nuclear weapons play a vital role in deterring conventional aggression. Thus the aim of a nuclear-free world also requires, as we pursue our SDI research, equally energetic efforts to diminish the threat posed by conventional arms imbalances, both through conventional force improvements and the negotiation of arms reductions and confidence-building measures.

SOVIET RESPONSE TO U.S. ATBM DEPLOYMENT IN EUROPE

Senator **Kennedy**. Secretary Perle, how would the Soviet Union likely respond to a large U.S. ATBM deployment in Europe? Do you believe the Soviets would remain willing to dismantle all SS–20s in their western theater or consider additional constraints on their SRINF in the face of such a deployment?

Mr. **Perle**. The Soviets have maintained a large shorter-range ballistic missile force opposite Western Europe for years, and have steadily upgraded its range and accuracy. The new shorter-range ballistic missiles which the USSR is now deploying present a major and growing threat to our Allies in the conventional and chemical as well as the nuclear areas. The Soviets have pursued this program despite the absence of ATBM defenses in Europe. Therefore, I do not believe that a NATO ATBM deployment would lead them to increase their non-strategic ballistic missile forces still further. On the contrary, in this area as in others, the determination of the

Alliance to counter the Soviet threat will increase their incentive to negotiate equitable force reductions and limitations.

SDI TECHNOLOGIES

Senator **Kennedy**. Secretary Perle, the Department of Defense's 1985 "Report to the Congress on the Strategic Defense Initiative", states that "the research necessary to support a decision on the potential utility of the SDI technology can be conducted in accordance with U.S. Treaty obligations." This determination was made under the assumption that the so-called "restrictive" interpretation of the ABM Treaty would remain in place.

In your testimony you suggest that the SDI program will have to depart from the restrictive interpretation during the research stage, prior to a decision to proceed to engineering development. Your view appears to contradict the earlier DOD assessment. Which view is correct, your own or the earlier DOD determination?

Mr. **Perle**. Since most members of Congress and their constituents are not technical experts, it is my personal view that they probably will insist on clear and graphic demonstrations of defense effectiveness that go beyond the confines of the restrictive interpretation of the ABM Treaty before they will be willing to support the development and deployment of ballistic missile defenses.

Senator **Wilson**. The hearing is adjourned.

[Whereupon, at 12:14 p.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

THURSDAY, APRIL 10, 1986

U.S. Senate,
Subcommittee on Strategic and
Theater Nuclear Forces,
Committee on Armed Services,
Washington, DC.

BINARY CHEMICAL MODERNIZATION PROGRAM

The subcommittee met in open session, pursuant to notice, at 9:07 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Present: Senators Warner, Goldwater, Quayle, and Glenn.

Staff present: Robert G. Bell, Robert F. Bott, Douglas R. Graham, William E. Hoehn, Jr., George K. Johnson, Jr., and Judith A. Freedman, professional staff members. Colleen M. Getz, research assistant; and Karen A. Love, staff assistant.

Also present: Gerald J. Smith, assistant to Senator Goldwater; Romie L. Brownlee, assistant to Senator Warner; John B. Keeley, assistant to Senator Levin; Thomas K. Longstreth, assistant to Senator Kennedy; Milton D. Beach, assistant to Senator Glenn.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator Warner. The subcommittee meets in open session this morning to receive testimony on the binary chemical modernization program in review of S. 2199, the fiscal year 1987 Department of Defense Authorization bill.

Our witnesses this morning will focus not only on programmatic issues, but also on the relationship of this important program to our relations with our allies and U.S. arms control objectives.

The urgent requirement to modernize the U.S. chemical deterrent with modern and safe binary chemical munitions has been a high priority issue for many of us on this committee. My colleagues and I have supported this program over many, many years, recognizing that it is not a politically popular position to take. However, we felt a responsibility to provide the men and women who serve in the U.S. Armed Forces with a credible and safe deterrent. I think I speak for many of my colleagues when I say that I am deeply gratified that the Congress as a whole has begun to recognize and assume this responsibility.

Our witnesses this morning are Hon. David Abshire, U.S. Permanent Representative to NATO; Dr. Tom Welch, the Deputy Assistant to the Secretary of Defense for Chemical Matters; and Mr. David Emery, the Deputy Director of the Arms Control and Disarmament Agency.

I would like to take this opportunity to welcome you all on behalf of the subcommittee this morning.

It is the intent of the Chair to proceed with the testimony of our three witnesses, which will be followed by an opportunity for questions.

The subcommittee will then reconvene in executive session to discuss some of the more classified aspects of this program.

Following our discussion of the chemical deterrent program, the subcommittee will remain in executive session to review the U.S. theater nuclear force programs.

Our witness for that session will be Dr. Larry Woodruff, the Deputy Under Secretary of Defense for Strategic and Theater Nuclear Forces.

I understand that Dr. Welch will lead off with a review of the chemical deterrent program itself.

But before we get underway, I would like to invite the chairman of the committee to make whatever comments he deems appropriate.

Chairman **Goldwater**. Mr. Chairman, I am a great believer in this program and we had better get along with it.

Senator **Warner**. Thank you.

Senator Glenn.

Senator **Glenn**. Thank you, Mr. Chairman.

Though I am not officially a member of this subcommittee, I appreciate your invitation to participate with it. I think the gentlemen at the witness table are aware of some of our debates last year on chemical weapons and our transatlantic phone calls, ad nauseum, for a while, almost, when this was up before us. I share the views that what we were concerned about was safety for our own forces. It wasn't whether we have chemical weapons, but it was safety for our own forces.

I think in all my time here in the Senate—which is only some 11 years—I have not seen anything demagogued quite as badly as that particular issue.

So it is a pleasure to be here.

Senator **Warner**. Thank you, Senator Glenn.

Chairman Goldwater and I remember last year, when we were allocating responsibilities during the course of the conference that you, Senator Cohen, and others undertook the responsibility for performing the delicate negotiations with Members of the House as it relates to the interests of this committee and of the Senate.

Indeed, I think it was your leadership and that of Senator Cohen that enabled this program to get underway last year.

Sentor **Glenn**. Thank you.

Senator **Warner**. Thank you for your attendance here this morning. I will insert Senator Thurmond's opening statement for the record per his request.

[Prepared statement of Senator Thurmond follows:]

Prepared Statement by Senator Strom Thurmond

Mr. Chairman, it is a pleasure to join you here today and I would like to add my welcome to Ambassador Abshire, Dr. Welch, and Mr. Emery. It is a pleasure to have you gentleman here to receive your testimony.

Mr. Chairman, I had the pleasure of meeting privately with Ambassador Abshire a few months ago. I must say that I feel that he is doing a outstanding job as our representative to NATO.

We have made some important steps towards modernization of our chemical retaliatory capability, but the task is far from finished. A modern stockpile in the United States is of little use as a deterent. Without forward deployment of binary munitions, the Soviets may still feel that they can use their stockpile early in conflict with relative impunity. This, as we are all aware, significantly lowers the nuclear threshold.

It is difficult for me to undestand why our allies accept nuclear weapos but refuse to accept chemical weapons which could help prevent the larger horror of nuclear escalation.

Mr. Chairman, I hope that Ambassador Abshire can help us in this area as we strive to support the President's modernization efforts.

Thank you, Mr. Chairman.

Senator **Warner**. Ambassador Abshire, I understand that you will introduce General Merritt.

Ambassador **Abshire**. Thank you, Mr. Chairman.

I am delighted that Gen. Jack Merritt is with us.

As you know, he was the distinguished Director of the Joint Staff. He is a very highly decorated officer. We are so pleased that he is the representative to the Military Committee. His delegation and my mission work closely together to come up with innovative answers to making your investment in NATO more effective.

I am happy he will join in these discussions.

Thank you, Mr. Chairman.

Senator **Warner**. I think that in order to set the framework for today's hearing, we will ask Dr. Welch to lead off.

STATEMENT OF DR. THOMAS J. WELCH, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY) (CHEMICAL MATTERS)

Dr. **Welch**. Thank you, Mr. Chairman.

I first would like very much to express my gratitude to the subcommittee and to the full committee for its support last year.

A year ago, when I appeared here, we asked for your help in arms control and raising the nuclear threshold, and some help in dealing with a safety concern we have with our unitary chemical weapons.

You acted. You were the spearhead. You took it through the Senate successfully and carried through in joint conference, and we are very pleased with that outcome.

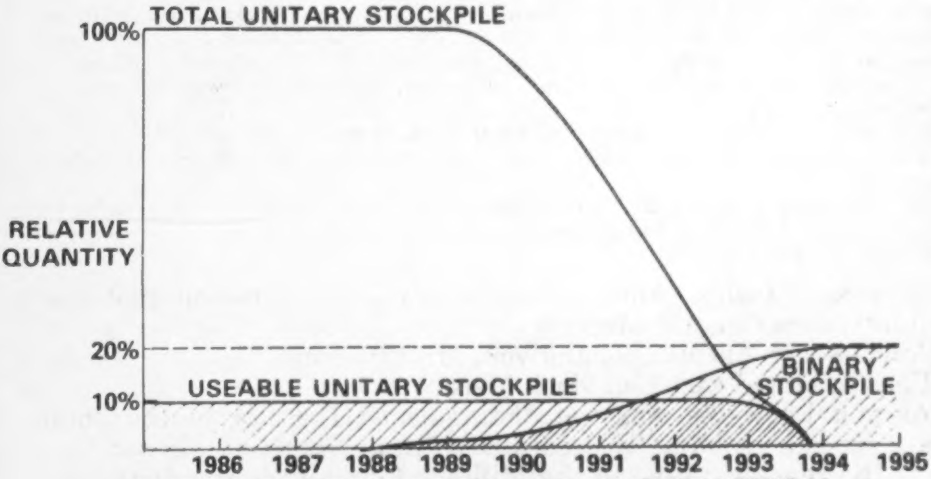
I express my gratitude.

With your permission, I will submit my prepared statement for the record.

I will, in the next few minutes, summarize the fiscal year 1987 request in this program. I will also discuss how we are meeting the legislative requirements which were part of last year's authorization and appropriations bills.

The heart of what we are asking for is displayed on the first viewgraph which I would like to show you.

DOD CHEMICAL PROGRAM



COORDINATED STOCKPILE DESTRUCTION AND MODERNIZATION

You will recall that last year we told you about our unitary stockpile and the concerns we had about its military usefulness, our concerns about safety.

Last year, you directed that DOD destroy the stockpile on a safe, but accelerated, way by 1994. We also pointed out last year that in that total stockpile, we considered no more than 10 percent of it as usable.

Indeed, the President's Commission on Chemical Warfare found that probably 3 percent of that stockpile is usable. So it makes good sense to destroy it, as we have sketched here.

At the same time, you directed that we would produce binary munitions and the timeline for binary production is shown here.

As you see, we will destroy the usable part of the stockpile last, which is common sense, and destroy it at the time we have a suitable quantity of binary munitions.

There were some legislative requirements to be met, and I would like to touch on these in the next minute.

CONSTRAINTS ON ACQUISITION OF BINARY MUNITIONS

ACTION	INTERESTS/PARTICIPANTS
NATO CONSULTATIONS – FORCE GOAL – DEPLOYMENT PLAN – STUDIES	OSD, STATE, NATO, ALLIES, OJCS, SERVICES
STORAGE AND TRANSPORTATION PLANS	OSD, OJCS, SERVICES
DESTRUCTION PLAN	OSD, SERVICES, DHHS, DOT, OJCS, AFFECTED STATES, EPA
HANDLING, STORAGE, SAFETY SPECIFICATIONS	OSD, SERVICES, EPA, DOT, DHHS
SECRETARY OF DEFENSE REPORT-BIGEYE	OSD, SERVICES, GAO
PRESIDENTIAL CERTIFICATIONS – ON CONSULTATIONS – ON STUDIES – NATIONAL SECURITY INTEREST	OSD, STATE, NSC, SERVICES, OJCS

As you see here, there were a number of requirements before we can produce binary munitions. I would also remind you of the number of players involved in satisfying these conditions—the JCS, as well as OSD, Health and Human Services, Department of Transportation, Environmental Protection Agency, and others.

Ambassador Abshire and General Merritt will discuss the NATO consultations in a moment and the arms control prospects will come from Mr. Emery.

I can tell you, however, that our deployment plan is in schedule. We expect it to be finished shortly.

The concept plan for destruction was submitted to the Congress on schedule last month. We are satisfied with EPA and others regarding the handling, storage, and safety requirements.

The Secretary will report out on the operational testing of the Big Eye bomb shortly. The President's certifications on the NATO consultations are scheduled for this summer on the NATO posture for October 1986, on production of binary being in the national security interest, or October 1, 1987.

Chairman GOLDWATER. Let me ask you a quick question.

On that right-hand side of the chart, entitled "interests and participants," I notice that nearly everything in town has something to do with this problem. Does that slow you down, help you, or what?

Dr. WELCH. Well, it certainly slows us down in the sense that we have to stop doing some other things and coordinate the safety, transportation, and other issues, Senator.

We feel we probably could have done those things responsibly ourselves. Nevertheless, the congressional language required that we do these things and we are going to do them, and we are going to do them properly.

Chairman GOLDWATER. All right.

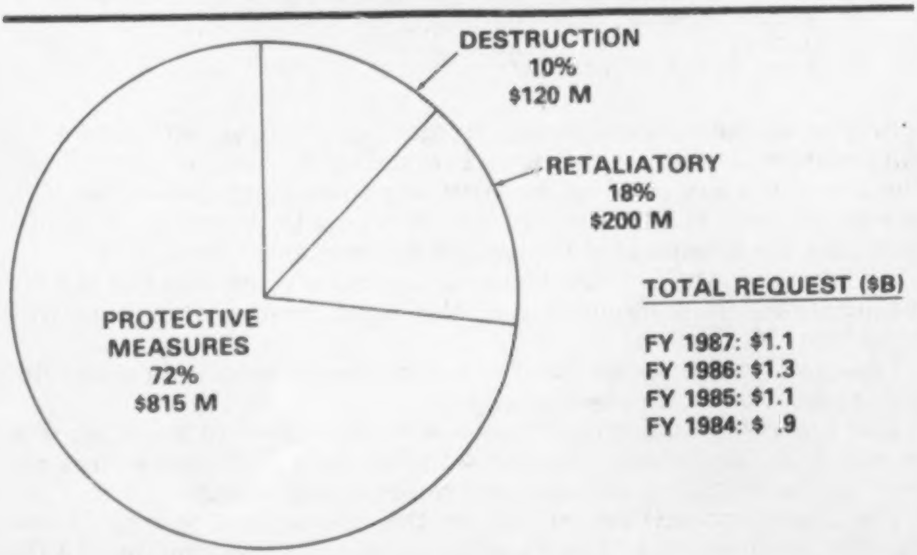
Dr. WELCH. We have moved out rather well, I think, with the production go-ahead given us by the Congress last year.

PINE BLUFF ARSENAL

We have, I would remind you, at Pine Bluff Arsenal, in Arkansas, a facility which will produce one of the binary components for the 155mm artillery shell. It has been built; it has been tested; it is ready to go. The second component for that shell will be purchased commercially.

Our fiscal year 1987 request, as a whole, again, resembles that which you have seen earlier.

FY 1987 CHEMICAL WARFARE DETERRENCE PROGRAM



Nearly three-quarters of it goes for protective or defensive measures.

It is somewhat less than last year, and this is due, in large part, to the reduction in the need to stock our war reserves. You have been very helpful over the years, and the Congress has been very helpful in providing funds for defense. We are reaching the point where some of our stocks are getting to where they should be.

The destruction program is roughly 10 percent of what we are asking for. This will continue the research and development on the best and safest ways of destroying that unitary stockpile. With our request to the Hill for destruction at this time, we need to point out that our destruction plan that you called for, to accelerate the destruction process with completion by 1994, will require greater expenditures. After we do some more work and after we hear back from you on the plan that we submitted a few weeks ago, we are going to be required to return and tell you what the fiscal impact of that destruction program will be.

Our environmental documentation for this destruction process should be ready in July. We will continue with our research and development efforts to reduce the costs, in particular the cryofracture approach to freezing and solidifying those chemical agents before we chop them up and destroy them.

Chairman GOLDWATER. Would you answer a quick question.

You have 72 percent of your dollar going for protective measures, and yet we don't have many chemical weapons in stock. Why do we need protective measures for something we don't have?

Dr. WELCH. If you are referring to the munitions, Senator——

Chairman GOLDWATER. Yes.

Dr. WELCH [continuing]. We are designing our protective materiel to counter the known Soviet agents. The materiel that we are asking for here, nearly all of it, is to go to the soldier, the airman, the marine, and so on, to protect him from those agents.

A small part of what we are asking for is for those depot workers who have to deal with the production and maintenance of chemical weapons. I am satisfied that they are getting the very best state-of-the-art equipment that they can, equipment to protect them.

Chairman GOLDWATER. Do you need this protection measure for binary or just for unitary?

Dr. WELCH. Only for the unitaries.

Chairman GOLDWATER. You don't have any of that left—do you?

Dr. WELCH. Yes, sir, we do. We are responsible for maintaining stocks of unitary munitions. They have to be checked for leaks. That requires people to take protective measures.

Chairman GOLDWATER. As I recall it, your first chart showed a line hitting zero.

Dr. WELCH. It is headed toward zero, but it won't be there, sir, until 1994 at the earliest.

Chairman GOLDWATER. All right.

Senator GLENN. Mr. Chairman, could I follow up on that just a little bit?

Senator WARNER. Yes.

Senator GLENN. Was that your 10 percent? Is it that we have so many of them that are not operational now or just suspect?

We have the big stocks up there right now, in existence, and that was a startling figure, that only 10 percent of that stock is usable.

Dr. WELCH. Yes, sir.

Senator GLENN. In open session, can we say why that is?

Dr. WELCH. We can, sir.

Ninety percent of it either is unable to be fired—for example, we have 500,000——

Senator GLENN. Is this danger of the actual physical shell itself, or is this just deterioration of the chemicals inside that make it nonlethal even if it was fired?

Dr. WELCH. It's a combination of both, Senator. We have some munitions which are leaking. The principal culprit here lies in those 500,000 6-foot-long M-55 rockets. They are well passed their shelf life and some of the agent is leaking.

In addition, we have shells with solidification taking place in those liquids, which makes them unstable in flight if they were to be fired.

There are other reasons, tactical reasons, why we consider some of the stocks not usable. For example, we have spray tanks that go back to the time of the Korean war that require a pilot to essentially crop dust a target, slow down over the target at a very low altitude. It is certainly not something that we would ask a pilot to do today.

Senator GLENN. Thank you.

Senator WARNER. There is also the danger of transportation to our own civilian community, isn't there?

Dr. WELCH. Yes, sir. I am glad you have raised that. That continues to be a concern. We do not want to move the unitary stockpile munitions through any of our towns, through the air or on trains, or whatever.

Senator WARNER. Or abroad.

Dr. WELCH. Or abroad.

There is no reason why we should have to face that, given that the binary opportunity is here in front of us.

Chairman WARNER. Now, Mr. Secretary, we are going to put your entire statement in the record. You might just pick up your pace a bit.

Dr. WELCH. Yes, sir.

I would at this time ask that Ambassador Abshire address the issue of the NATO consultations and other programmatic issues within NATO.

[The prepared statement of Dr. Welch follows:]

PREPARED STATEMENT BY DR. THOMAS J. WELCH, DEPUTY ASSISTANT TO THE SECRETARY OF DEFENSE (ATOMIC ENERGY) (CHEMICAL MATTERS)

Last year, shortly after assuming my position, I asked you to help prevent the use of chemical weapons against the men and women or our Armed Forces.

To achieve that goal, we asked for your help in arms control; help that would produce a verifiable treaty prohibiting even the possession of chemical weapons.

We asked for your help in strengthening the NATO alliance and in raising the nuclear threshold.

We asked you to assist us in eliminating the safety concerns associated with the lethal chemical munitions now stored in our country.

In all these areas, Mr. Chairman, you and your committee spearheaded the effort that contributed to all of these critical national security objectives and I would like to thank the committee for leading the fight. Today, we are here to discuss the next step. We will discuss how you can finish what you began last year and how you can help with the remaining tasks.

In moving to restore the adequacy of our chemical deterrent, the Congress has firmly signaled U.S. resolve to insure that chemical weapons are never used against the men and women in our Armed Forces.

That signal is reflected in the status of our efforts to achieve an effective, verifiable ban on chemical weapons.

We have pursued chemical arms control for more than ten years. From 1976 until 1980 the U.S. and U.S.S.R. held bilateral talks aimed at working out a joint initiative for banning chemical weapons. In 1980, the U.S. shifted its efforts to the conference on disarmament in Geneva, the United Nations multilateral forum for arms control and disarmament issues. In April 1984, Vice President Bush tabled a U.S.

draft treaty for a comprehensive ban on chemical weapons, but the Soviet Union has yet to respond seriously to that draft.

U.S. restraint in the chemical weapons area has not elicited a corresponding restraint from the Soviets nor has it had any salutary effect on arms control negotiations. The effect has been quite the opposite. The Soviets, seeing their chemical superiority vis-a-vis the U.S. and NATO increase each year, apparently have found little incentive to negotiate on the extensive and far-reaching verification measures a comprehensive ban would require.

But now we see that your action to fund the modernization program coincides with some signs of movement on the part of the Soviet Union. Soviet statements throughout much of 1985 argued that approval of U.S. binary modernization would undermine chemical weapons arms control efforts. However, once it became clear that U.S. funding had been approved, the Soviets showed a noticeably greater interest in those efforts, returning to the table for informal sessions in October and January and, as agreed at the summit, for accelerated U.S.-U.S.S.R. bilaterals in January 1986. We cannot say unequivocally that our chemical modernization program will provide sufficient incentive for the Soviet Union to accept an effective, verifiable ban. But there is no doubt that continued congressional resolve toward restoring an effective U.S. chemical deterrent will provide our negotiators with the necessary leverage definitively to test Soviet intentions.

In acting to approve binary modernization, you have also strengthened the NATO alliance. We are now working with our allies with a view to fulfilling the various conditions of the legislation that relate to NATO. This effort is currently underway, and it is important that the effort run its course through the long established NATO channels of communication which have proven effective in dealing with common alliance defense issues. We must try to avoid a politicized debate in European parliaments and elsewhere which would detract from the clear incentive for progress in arms control which are now able to present the Soviets. The U.S. modernization effort is a significant first step toward establishing a credible NATO deterrent. The continuing progress toward that end makes far less likely a resort to nuclear weapons in response to a Warsaw Pact chemical offensive. This is clearly consistent with all other NATO actions to push back as far as possible the time when a decision to use nuclear weapons would have to be made.

I should also point out that the chemical warfare threat is not only to NATO and involves more than Soviet use and capabilities. The Iranian chemical warfare casualties displayed in London, Stockholm, and elswehere are stark reminders of the problem of the dangerous spread of chemical weapons. The time may come when U.S. forces employed anywhere in the world could face use of lethal chemicals by an adversary. We must never allow our young American servicemen and women to stand in the place of those tragic figures from Iran who are now so starkly reminding us of the reality of modern chemical war.

Finally, your action has brought into view that day when no lethal chemical warfare agents will be stored in U.S. depots anywhere. Our plan for destruction by 1994 of the entire unitary stockpile in conjunction with acquisition of an adequate binary stockpile was submitted to the Congress last month. The direct link between destruction of the unitary stocks and production of safe, more effective binary munitions underscores our intent to maintain the smallest, safest stockpile that denies a significant military advantage to any initiator of chemical warfare. The environmental impact statement for the overall effort is being prepared and is expected to be filed this summer. A decision of the particular destruction option to be used will follow in January 1987. The destruction of the already unusable 90 percent of the unitary stockpile is then a matter of executing the program to its completion in 1984. With acquisition of an adequate number of binary munitions to provide a credible deterrent, the remaining 10 percent of the lethal unitary stockpile can be destroyed concurrently. The initial step has been taken. The destruction effort and the modernization effort are intimately linked. It is essential that they be jointly supported by the Congress to ensure that those thousands of tons of lethal chemical agents sitting in depots in all parts of the country can be destroyed.

Clearly, last year's action by the Congress was a major step in the direction of what must be our ultimate goal: The prevention of chemical warfare. We now ask you to follow through on these efforts. The trends—toward a stronger NATO alliance, toward a higher nuclear threshold, toward elimination of lethal chemical agents from storage sites—all of which encourage progress in arms control—must be continued. Two months ago, the Secretary of Defense addressed the importance of follow-through in his FY 87 annual report to the Congress. He said:

"Our rebuilding of American military strength is redefining the terms of the U.S.—Soviet relationship. Rather than dealing from weakness (and the prospect of greater relative disadvantage), the United States is now beginning to deal from strength and the promise of greater relative strength. We must persuade the Soviets that this is not a short-term commitment. Nothing could so enhance the prospects for long-term peace as Soviet acceptance of the proposition that they can achieve no significant exploitable military advantage over us."

This conclusion about our overall defense effort is no less applicable to our chemical deterrence program. It is important, perhaps more so than ever before, important that we follow through with what we have begun to ensure these outcomes that we all desire. The program we have developed for FY 87 continues the themes of the previous year and builds on our accomplishments to date. It is a comprehensive and well thought out effort which seeks to achieve the maximum national security return on the investment made.

Our program seeks to prevent chemical warfare through three mutually supporting elements. We will continue to seek a comprehensive, verifiable ban on chemical weapons. We will maintain a strong defensive posture by providing the best available defensive equipment and systems to our service personnel. And, we will develop a chemical retaliatory capability sufficient to deter use of chemicals against us by providing an ability to negate any advantage an adversary might perceive in initiating chemical warfare.

Moreover, to the extent that they make chemical war less attractive as a means of gaining a military advantage, the defensive and retaliatory components of our program directly promote our arms control effort. For nations to accept a treaty, it must clearly support their national security interests. Such acceptance by the Soviet Union would seem unlikely so long as a major advantage appears achievable through their use of chemical weapons.

Our program continues effort in the areas of defensive measures, rataliatory capabilities and destruction in about the same proportion as in previous years.

Even though most of the discussion has focused on our chemical retaliatory capability, almost three-quarters of our FY 87 proposed budget is for equipment to help our forces defend against a chemical attack. That equipment consists of masks, boots, gloves, clothing, detectors, decontamination systems, and shelters not only to keep our troops alive, but also to enable them to continue to operate under chemical attack conditions.

A strong chemical defensive posture is essential to chemical deterrence even in the presence of a satisfactory retaliatory capability. To protect our soldiers from an initial strike and to ensure we are no more vulnerable to attack than our potential adversaries, we must continue to improve our ability to survive and sustain operations in the chemical warfare environment. With your assistance, we have made significant progress in this area and we solicit your continued support.

The FY 87 budget for chemical defense is $815 million. We are making significant strides in procuring improved protective masks, chemical detectors, protective shelters, and decontamination systems that will increase our ability to survive and operate in a chemical environment. Our growing concern is that the Soviet Union has managed to produce some novel and unknown agents against which our existing defensive equipment would be ineffective. Accordingly, we devote part of our research and development budget to looking for ways to protect against these unknowns. We further recognize that the number of unknowns could be very large and that we must therefore tailor development programs to address universal threats rather than specific ones.

We will not accept duplication among the various services regarding chemical defense developments. The joint service agreement for chemical warfare and chemical/biological defense was signed by the services Secretaries responsible for research, development, and acquisition in July 1984. The agreement ensures that the services conduct coordinated programs to meet, within the constraints of resources available, the highest priority requirements of all the services. The joint service agreement is working. Over forty efforts that were clearly redundant among the services have been eliminated and we are continuing to scrutinize the defense program for other repetitive efforts. This is a success story which will only get better.

The Army remains the designated lead service in chemical defense research and development. Their FY 87 budget request is for a total of $337 million. About half this amount, $161 million is for research and development or equipment, much of which has joint service applications.

The goal of Army research and development in detection, protection, and decontamination materiel, is to take advantage of advanced technology to develop equipment which is smaller and easier to operate, but with greater operational capability. We must continually look for ways to reduce the burden to the individual and unit. Examples of the programs being pursued include preplanned product improvements on the protective masks; development of equipment to provide soldiers a contamination-free environment critical for survivability on the NBC battlefield; biological and toxin detectors research; standoff detectors that will see the gas cloud and warn our soldiers before it reaches them; and more effective, less logisticaly burdensome decontamination equipment. The Army is also exploring methods for networking detection devices together in order to provide airfield and other fixed site and area coverage.

Of the Army research program, $154 million is for medical defense against chemical and biological attack. The Army continues research on providing agent vaccines, pretreatments and antidotes for known and suspected new agents. Patient decontamination, treatment, and support systems are also included in this effort.

In FY 87, the Army will continue procurement of a lightweight decontamination system, a new protective mask, and simplified collective protection equipment. The latter is essentially a bag inflated inside an existing room to provide it with filtered air for chemical protection. FY 87 continues procurement of existing protective clothing and equipment for training and exercises, as well as for U.S. direct hire host nation personnel and for war reserves. With your support, the Army has built up its war reserve of protective clothing over the years, and is now in a position to reduce its request in this area from the FY 86 amount of $91 million to $26 million in FY 87. With the inclusion of operations and maintenance (O&M) funds, the Army's total request for all of these purchases is $182.8 million.

We also request $35 million for the upgrade of the chemical test facilities at Dugway Proving Ground. This includes instrumentation improvements, professional and support personnel, and military construction to replace inadequate and obsolete test chamber. This is an extremely important effort not only because it provides a means of testing newly developed equipment but also because it provides the means for more realistically defining the impact of chemical weapons on the battlefield. With a better understanding of how chemical agents affect tactical operations, command and control we can better define the parameters for risk assessment and move toward an innovative approach to chemical defense. To the degree that these efforts reduce the degradation imposed by enemy chemical agents, they will reduce the potential advantage to be gained through their employment and, thus, the likelihood of their first use.

Turning to the chemical defensive program for the Navy and Marine Corps, their request for chemical defense-related research and development for systems unique to naval and amphibious operations totals $12.9 million. Efforts focus on both shipboard and shore based detection and warning systems.

Procurement and O&M funding for Navy and Marine Corps chemical defense equipment totals $55.8 million. These funds continue acquisition of individual protective equipment for shore and shipboard personnel. Detectors for overseas locations and shipboard applications are included. The Marines will also be procuring some decontamination systems this year.

In FY 87, the Air Force is requesting $44.7 million to pursue Air Force unique research and development activities as well as those levied under the terms of the joint service agreement such as aircrew protection and fixed site collective protection. Of this amount, $13.4 million will go toward medical chemical defense needs associated with aeromedical casualty handling, treatment, and transport; detection and warning, and decontaimination. A primary thrust of the Air Force program is to complete development of an improved protective mask system for aircrew members. The system will replace an adaptation of a firefighters smoke mask and will make a significant improvement in allowing aircrew members to perform flight duties in a near normal manner. The Air Force also expects to make a production decision on transportable collective protection systems designed to provide collective protection to mobile, deployed forces.

The Air Force will continue procurement of a new protective mask for ground support personnel. In addition, the Air Force will be increasing the number of survivable collective protection systems overseas from 155 to 299. For radar control vans and equipment, the Air Force will begin procuring modular collective protective equipment. Air Force O&M funds will support replacing protective ensembles and other equipment items used for training and exercises, as well as equipping other units with their full complement of required protective gear. The total Air Force procurement and O&M request is $157.6 million in FY 87.

Finally, the Air Force seeks $10.7 million in military construction funds to incorporate chemical collective protection in conventionally hardened pilot operations and avionics facilities.

These defensive improvements which represent more than 70 percent of the DOD chemical program are required regardless of the status of chemical arms control or retaliatory programs. In keeping with our longstanding policy of no first use of chemical weapons, we must be ever capable of withstanding a chemical first strike and pursuing the course of the battle to a favorable conclusion under chemical warfare conditions.

The program related to management of the deterrent stockpile and retaliatory systems comprises the remaining 30 percent of the DOD request.

A third of that, about $120 million, supports the program for destruction of the existing unitary stocks. However, in keeping with the congressional mandate for a comprehensive destruction effort which will completely eliminate lethal chemical agent storage by 1994, we are revising our destruction effort. Destruction of the entire unitary stockpile on an accelerated basis is potentially costly and will require careful review to ensure that we maintain our focus on safety and the environment. As the plan submitted in March clearly demonstrated, the alternatives to be considered involve difficult choices with regard to the storage sites, their surroundings and the numerous locations that would be affected by transporting the munitions to regional or national destruction centers should one of those options be chosen.

We will need your assistance in carrying this program through to its much desired conclusion. This year's request does not reflect the major resources impact of the national destruction program. We expect the ultimate cost of this destruction effort to be about $1.7 billion over the several years of construction and operations leading to completion in 1994. With the choice of disposal option as yet unmade and necessarily dependent on completion of the environment documentation, we cannot yet precisely identify the front end investment required to insure with confidence the attainment of the 1994 completion date. Nevertheless, we anticipate that initial procurements in the first year or two of the effort may well approach one-third of the total program requirement. That level of expenditure will clearly make a difference in the distribution of program resources, and we will need your help to ensure the course of the remainder of our program stays on track.

Recognizing the size of this effort, we are continuing our search for new technologies which will reduce costs and simplify operations while maintaining the high levels of safety and security we have achieved over the history of the destruction program. Approximately $10 million in RDT&E funds will support our advanced technology effort. The effort includes cryofracture techniques for chemical munitions, circulating bed combustor furnace technology for bulk chemical agents, robotics applications and improved monitoring equipment.

About $50 million is required to purchase equipment for testing at the chemical agent munitions disposal system at the Johnston atoll site and the Tooele Army Depot disposal facility in Utah. A portion is also for testing at the chemical agent munitions disposal system at Tooele. $60 million in operation and maintenance funds will be required to continue testing, operations, technical support and management for the destruction program.

As directed in last year's legislation, all funds except military construction have been transferred to an old funding line. The Army as DOD's executive agent for stockpile destruction will continue to execute the program.

The retaliatory program for FY 87 continues with the systems approved last year—the 155 MM binary chemical artillery projectile and the Bigeye binary chemical bomb. Research and development on the binary chemical warhead for the multiple launch rocket system, the third component of our binary chemical deterrent continues. Additional research and development is applied to the search for novel lethal and incapacitating chemical agents as well as for follow on delivery systems with desirable increased range or standoff capabilities. The total request for the retaliatory part of the program is $200 million or about 18 percent of the total.

About $158 million of that amount continues the 155 MM projectiles and Bigeye bomb programs. As I mentioned earlier, we have initiated the work required to satisfy the conditions imposed last year on funding for production of the 155 MM projectile and procurement of facilities for the Bigeye bomb. That effort is proceeding well and I believe we will be in a position to execute these programs by this summer. That is consistent with our projected schedules for acquisition of these systems and supports our overall acquisition strategy.

The Army is requesting $86.3 million to continue procurement of the 155 MM, GB-2, binary chemical projectile. These funds provide the second year of production of this system and a facility for production of the reagent DC which will be used to produce the binary component DF for the second and subsequent years of production. They also expand the metal parts facility at Louisiana Army Ammunition Plant to support the optimum production rate for the 155 MM binary projectile. Given that all conditions on production funds are satisfied by July 1986, we expect to be able to produce the first complete 155 MM binary projectile in December 1987.

We are proceeding with operational testing of the Bigeye bomb. Due to the Congress' concern over its technical performance, production funds for Bigeye were not approved last year. However, your action in approving funds for facilities for Bigeye reflects a degree of confidence in our ability to solve the remaining technical problems and move on to production of this vital long-range persistent chemical deterrent system.

The Navy and Air Force have completed the first phase of Bigeye operational testing. Both services' preliminary test results indicate that the system is potentially ready for limited production subject to correction of shortcomings identified during the test program. It now appears that correction of those issues can be accomplished to allow consideration of a limited production decision in July of this year at the earliest. Given a favorable decision, we must be in a position to move forward with low rate initial production in FY 1987. The Air Force and Navy have accordingly requested a total of $56.9 million to support that first production increment.

In the meantime, obligation for the funds for Bigeye facilities must await the completion of the tasks specified by the legislative constraints and the outcome of the planned corrective actions. Based on the anticipated schedule for the low rate initial production decision, there is sufficient time available to build the facilities in support of the currently planned September 1988 initial operational capability.

A deep strike weapon is a critically needed deterrent system and we are confident that we can meet the technical challenges identified during the first phase of Bigeye operational testing. On the other hand, we are realistically assessing the progress of this system to insure that it achieves the minimum standards necessary to assure its meaningful contribution to deterrence. The Secretary of Defense will shortly submit his evaluation of Bigeye performance to date as required by last year's legislation. That Department of Defense level review is only one of many that have been and will continue to be applied to make sure that Bigeye meets the test. I assure you that neither facilities nor production money for Bigeye will be spent until we are certain it is ready for production.

The total request for the Bigeye program is $77.2 million in FY 87. In addition to the previously mentioned production funds, the Army is requesting $15.4 million for a second source of Bigeye metal parts. As a result of competition for that contract, we project savings of up to twenty percent in total system acquisition cost. The total also includes $5.0 million in RDT&E to carry the test program and corrective actions to completion.

Additional research and development for the retaliatory program requires a total of $37.2 million. This includes $25.3 million to continue the previously mentioned effort on the binary warhead for the multiple launch rocket system and $11.9 million for basic research and exploratory development of future retaliatory systems. In addition to supporting further work on the existing binary agents, the exploratory effort seeks novel lethal and incapacitating compounds to provide a degree of insurance against technological surprise and to maintain the currency of our retaliatory technology. This effort is closely linked to continuing work on follow on delivery systems which will incorporate greater range, greater acuracy and standoff capabilities. The binary MLRS system is a good example of building on an existing system; taking advantage of a fielded delivery capability to expand the scope of our chemical deterrent at the least possible cost. A long-range master plan for future development of retaliatory systems is among the projects which will insure our future chemical systems are survivable, readily usable and affordable.

In sum, our FY 87 chemical deterrence program requires $1.14 billion to continue these vital programs and follow through on our mutual search for an end to chemical warfare. We must be resolute in our intent to keep these lethal chemicals off the battlefield. We must be firm in supporting our arms control negotiators with the ability to negotiate from a position of strength. And, we must insure the safety of the men and women of our Armed Forces from the effects of these devastating weapons.

The soldiers, sailors, airmen and marines need your help. They do not want to go onto a battlefield, whether in Western Europe, the Middle East, or Korea, and appear so weak as to invite chemical attack. We want a verifiable treaty that prohibits the possession of chemical weapons. Until a treaty is in hand, we want to deter chemical weapon use. Defense is necessary but not sufficient; we must have a retaliatory capability to deter first-use. Today, we do not have the needed retaliatory capability. We have an obligation to remain—and indeed we intend to remain—on the moral high ground with respect to chemical warfare. We must continued to do what is necessary to ensure that chemical weapons are never used against the men and women of our Armed Forces or those of our allies. If there is anything reprehensible, abhorrent and unacceptable about chemical warfare, it is not doing all that we possibly can do to discourage the use of chemical weapons against our people in the field.

Senator Warner. Ambassador Abshire, the members of this committee are very grateful and respectful of the delicacy with which you have dealt with this difficult issue through the years. We fully recognize the skill and diplomacy that you have exhibited in bringing our allies to a pragmatic and realistic approach to this.

Much remains to be done by yourself and others in this area. We are off, I think, perhaps to the first positive start that we have witnessed in many years. We express our appreciation to you.

STATEMENT OF HON. DAVID ABSHIRE, U.S. PERMANENT REPRESENTATIVE TO NATO, ACCOMPANIED BY GEN. JACK N. MERRITT (USA), U.S. REPRESENTATIVE TO THE NATO MILITARY COMMITTEE

Ambassador Abshire. Thank you very much, Mr. Chairman.

It is an honor for me to appear before this subcommittee.

I admire very much the leadership that the committee has taken. I will submit my longer statement for the record. I would like to pick certain highlights from it and give you the viewpoint from the NATO headquarters as General Merritt and I see it.

Our concern is that with no credible nuclear deterrent, NATO would have to consider a nuclear response to a chemical attack. Limiting NATO to that single response is clearly unacceptable.

I would point out that the new Defense Yearbook of Britain's Royal United Service Institute and Brassey's—this is a European professional publication—makes this central point, and I quote:

> In view of the very limited retalitory capacity presently existing within NATO * * * the prospect of a nuclear response to a chemical attack has all the disadvantages of a tripwire strategy, except in the event of a massive chemical offensive.

I point this out because a couple of years ago, when there was much debate in the Senate about whether we had a tripwire strategy, which we all want to get away from, this was a very central issue, and I think it goes quite to the heart of the matter of the NATO situation.

At NATO headquarters, under Lord Carrington and General Rogers at SHAPE, we have all been trying to move away from such a tripwire strategy, which could result either from a lack of conventional sustainability or insufficient CW retaliatory and defensive capabilities.

If we do only the conventional—and we have made enormous strides in the last 2 years in improving our conventional capabilities—if we do all of that, without the chemical, we invalidate part of those millions we are investing in conventional improvements.

The CW loophole in deterrence remains, and, as we get into the 1990's, will grow.

If I may, I would simply add that I know the emotional problems. We have them in Europe. Some people have moral problems with the production of chemical weapons. I can understand such a dilemma. But I, for one, dealing with this, close up, have a much worse moral problem, by far, in supporting the strategy that would offer nuclear war as an answer to Soviet selective use of chemical weapons. Such a solution is enormously disproportionate.

One moral principle that I think has been generally accepted since the writings of Hugo Grotius and others and foreshadowed in the writings of St. Augustine on "just war" in a sense of proportionality, and that is central to the problem that we are dealing with. In short, the development of a chemical capability to retaliate, in kind, on a limited scale, is essential to deterring chemical warfare and avoiding considerable potential for resorting to nuclear escalation early in a conflict.

Our strategy is based upon deterrence by denial and retaliation with flexible response throughout. Either we consistently base our actions on this strategy, which includes the possibility of CW, or we contribute to invalidating it.

Mr. Chairman, I would emphasize that, as we look at the CW improvements, a fact that some do not understand, we are not suggesting that NATO has some new doctrine on the binary program. NATO recognizes the necessity of a modern alliance chemical weapons deterrent. The alliance's approved strategy, going back to the adoption of flexible response in 1967, states that NATO should rely principally on its conventional and nuclear forces for deterrence. It also states that as an additional deterrent, NATO should possess the capability to employ lethal chemical agents on a limited scale in retaliation.

Within this context, allied leaders support the modernization program that Congress has approved.

But, Mr. Chairman, it is good common sense that we have tried to avoid having this issue become a political football in Europe, as did, unfortunately, the enhanced radiation weapon and the way that it was demonized.

During the authorization and appropriations process last year, you worked with us to develop language which could avoid this. In the final analysis, it is, in fact, wholly a U.S. decision to produce binary weapons. Additionally, binaries are rapidly deployable in a crisis, and deployment is being built into our plans for the reinforcement of Europe, if warranted by the threat or the fact of an attack.

So, when binary production offered us these advantages, it just did not make good sense to politicize the issue. What did make sense was to use existing NATO machinery to move forward in what I call a professional way, by asking NATO to adopt a force goal in the same way as any other force goal would be handled.

By way of explanation, let me briefly state what a NATO force goal is and leave with you a detailed paper on it.

The major NATO Commanders effectively begin the process by formulating force proposals after consultations with nations. The NATO Military Committee, on which General Jack Merritt sits, then reviews and approves the force goal proposals and forwards them to the political side, my side of NATO.

Now, as a matter of fact, NATO consideration of the force goal requiring U.S. binary production is well underway. On February 13, General Merritt's NATO Military Committee approved the package of force proposals, including SACEUR's CW force proposal for the United States.

The Defense Review Committee, or the DRC, must then examine the Military Committee's force proposal package for each NATO nation, with regard to financial, economic, and political implications. This review, which includes both bilateral and multilateral consultations, insures compatibility with guidance previously given by ministers.

For this year, by the way, the review by the DRC should be completed by May 1986. The DRC, Defense Review Committee, then forwards the proposals—at that point, draft force goals—to the NATO Permanent Representatives—my group—for consideration.

This next step in NATO's consideration of the draft force goals asks that the Permanent Representatives, meeting as the Defense Planning Committee, or the DPC, adopt the draft force goals.

Defense Ministers, meeting as the DPC in Ministerial Session this May, will be asked to "note" the Permanent Representatives' actions. This is the way the force goal procedure always takes place. Adoption by the DPC Permanent Representatives and noting by the Defense Ministers completes the action of the force goals.

While I am on the subject, Mr. Chairman, let me point out a technical and procedural problem which has been slightly awkward for us, but not insurmountable.

The current legislation speaks of approval by the North Atlantic Council, or the NAC, as we call it. As I have pointed out, it is the Defense Planning Committee that has jurisdiction over force goals. Because it is key to understanding the nuances of actions taken by NATO, let me review the distinction between the NAC and the DPC.

When France withdrew from the NATO's military structure in 1967, the alliance needed a separate forum to address issues related to defense, a forum where France could not be seated. This forum was called the "Defense Planning Committee."

The DPC took upon itself, with the agreement of France and the NAC, the military portfolio. Therefore, in matters related to the integrated military structure, the DPC exercises the authority of the NAC.

Mr. Chairman, since I prepared my testimony, I did some further research on this subject. In 1963, there was a Council memorandum that indicates the institution of the NATO force planning concept. This is while France was still in the Integrated Command.

The committee noted that it would not always be necessary for all members of NATO to meet in that planning group.

When the French withdrawal took place, in the Council summary records of 1966—when that withdrawal began; this was on November 16, 1966—there was adopted by the North Atlantic Council, with the French present, an extension of the activities of the DPC from the planning field to all integrated matters and all activities in which the French would not participate.

So, the grant of authority in relationship to the North Atlantic Council and the DPC is there. We consider the process that we are carrying out is in line with literally what your legislation says and within the spirit of the legislation it is an awkward way of expressing it.

Senator **Warner**. Mr. Ambassador, would you kindly submit to the committee your draft or revision that you feel would be necessary to correct this technical situation?

Ambassador **Abshire**. I would be happy to, Mr. Chairman.

[The information referred to follows:]

The legislation would more accurately reflect established NATO procedures if section (B) NATO Consultations (1) read as follows: "has submitted to the North Atlantic Treaty Organization, a force goal stating the requirement for modernization of the United States proportional share of the NATO chemical deterrent with binary munitions and said force goal has been formally adopted by the North Atlantic Treaty Organization's Defense Planning Committee meeting in permanent session."

Ambassador **Abshire**. The United States is still developing in consultation with SACEUR the plan for contingency deployment of binary munitions in a crisis situation.

We have already heard some Allied views on the context of this plan, and we will consult formally with the alliance once the plan has been completed. By the time the President makes his report to Congress, on or before October 1, 1986, we will have conducted full and positive consultations with allies on all issues relating to the CW modernization program required by the congressional legislation.

Mr. Chairman, let me point out that with some people there has been a confusion. We are going through very thorough consultations, and our desire not to politicize the issue should not be confused with the fact that these consultations and actions at NATO are very thorough, indeed.

Mr. Chairman, in my testimony, I note four reasons why it would be an enormous setback to NATO with this legislation this year, would its funding not be successful.

I will not repeat those here. But I would add a fifth reason to my testimony.

The fact that we are so deeply involved in this process at NATO, and successfully involved, would mean that, because of Gramm-Rudman or other reasons, if we did not obtain funding this year, it would send to the Europeans what I might call—to use that expression again—an "uncertain trumpet" rather than a certain one.

In the whole defense area, naturally, Europe is watching us very closely. We have moved forward in this critical area. So this is not the year to fail.

Thank you very much, Mr. Chairman.

[The prepared statement and attachment of Ambassador Abshire follow:]

PREPARED STATEMENT BY AMBASSADOR DAVID M. ABSHIRE, U.S. PERMANENT REPRESENTATIVE TO THE NORTH ATLANTIC TREATY ORGANIZATION

CHEMICAL WEAPONS MODERNIZATION

NATO's raison d'etre is to deter war of political intimidation in Western Europe. Deterrence can be achieved in two ways: One, deterrence by denial, that is making it unmistakably clear that a potential aggressor will not achieve the objectives of his aggression, and two, deterrence through the threat of retaliation, that is, showing a potential aggressor that, even if successful, the cost of aggression will be unacceptably high.

In the absence of a comprehensive and verifiable ban on chemical weapons—to which all NATO is fully committed—the Alliance needs not only good defensive capability, but also credible chemical retaliatory capability. With no credible chemical deterrent, NATO would have to consider a nuclear response to a chemical attack. Limiting NATO to that single response is clearly unacceptable. The new *Defense Yearbook* of Britain's prestigious Royal United Services Institute and Brassey's makes the point: "In view of the very limited retaliatory capacity presently existing within NATO . . . the prospect of a nuclear response to a chemical attack has all the disadvantages of a tripwire strategy, except in the event of a massive chemical offensive." (London: Brassey's Defensive Publishers, 1986, P. XIII).

I quote this esteemed non-American publication first to suggest broad professional judgment on this matter but, second, to sum up more succinctly what I consider the heart of the matter. This United States Senate, the NATO headquarters under Lord Carrington, and General Rogers at SHAPE have all been trying to move us away for such a tripwire strategy, which could result either from a lack of conventional sustainability or insufficient CW retaliatory and defensive capabilities. If we do only the conventional without the chemical, we invalidate part of those millions we are investing in conventional improvements. The CW loophole in deterrence remains and in fact is growing.

I know many people have moral problems with the production of chemical weapons. I can understand their dilemma. But I, for one, have a much worse moral problem, by far, in supporting a strategy that would offer nuclear war as an answer to Soviet selective use of chemical weapons. Such a solution is enormously disproportionate. One moral principle accepted fairly generally since the writings of Hugo Grotius, foreshadowed in the writings of St. Augustine on "Just War," is the sense of proportionality.

In short, development of a chemical capability to retaliate in kind on a limited scale is essential to deterring chemical warfare, and avoiding considerable potential for resorting to nuclear escalation early in a conflict. Our strategy is based upon deterrence by denial and retaliation with flexible response throughout. Either we consistently base our actions on this strategy, which includes the possibility of CW, or we contribute to invalidating it. I have been to both Ypres in Flanders, where chemical weapons were first used in 1915, and to Hiroshima in Japan. I recognize the lingering effects of both for those who survived, but continue to suffer. Both nuclear and chemical weapons are horrible: our strategy—at NATO and during negotiations in Geneva—is to see that neither are used. This is why your congressional support is so essential.

Soviet attitude toward chemical warfare stem in part from their history. In WWI, the Soviets suffered 475,000 chemical casualties; more than any other nation. With this experience in mind, they have apparently resolved never again to be inadequately prepared for chemical warfare. As a result, the Soviet Union has developed the most extensive chemical warfare capability in the world.

Following WWII the Soviets dismantled two German nerve agent plants and moved them, along with the scientists who worked in them, to the Soviet Union, where they began production of nerve agent weapons. The Soviets, subsequently, built other chemical agent manufacturing facilities based on the design of those two plants.

The Soviets continue to produce and have forward deployed chemical agent stocks and munitions. The Department of Defense estimates the Soviets have at least ten chemical agent production facilities and another six chemical weapon storage depots in the Soviet Union. In addition, DIA estimates there are another thirty forward storage sites for chemical munitions in Eastern European countries. Moscow possesses the capability to employ both non-persistent and persistent chemical agents, with nerve, blister, blood, choking and unidentified novel agents at its disposal. In addition, the Soviets have the capability to deliver chemical agents with almost all of their conventional weapons systems—including: tube artillery; multiple rocket launchers; tactical ballistic missiles; and aircraft employing bombs, rockets and spray tanks.

Likely targets for Soviet use of chemical munitions include: NATO's theater nuclear delivery systems; airfields; naval bases and seaports; key command and control facilities; major storage facilities; and frontline NATO forces critical to WP plans.

The size of chemical weapons stockpile is a point on which intelligence experts do not agree. That disagreement, however, should not be allowed to overshadow the fact that even the most conservative estimates indicate Soviet stocks are several times greater than the usable portion of the U.S. inventory. The evidence certainly is more than sufficient to establish the existence of a major Soviet program to produce and, in time of war, to employ chemical weapons. Their stockpile clearly exceeds their defensive requirements and is apparently designed to support offensive operations.

We are also interested in Soviet doctrine for the employment of offensive chemical weapons. One may ask how early after the start of hostilities the Soviets might employ chemical weapons. They have three broad options:

(1) As part of their initial attack on NATO;

(2) Some time after the opening of hostilities but before escalation to nuclear weapons; and

(3) Simultaneous with or after nuclear weapons employment.

A second question about their doctrine is whether they will employ chemical munitions on a massive scale across wide areas or only selectively against precise targets. Although in the latter case the geographic size of the target would be greatly reduced, the Soviets are still expected to use large quantities of chemical munitions to ensure adequate target coverage. Soviet doctrine for chemical weapons use has gone through changes.

As Committee members are aware, Soviet operational doctrine for conventional war began to take advantage of their increasing superiority, of reduced warning time, and of new approaches, such as operation maneuver groups, and other blitzkrieg tactics derived in part from their close study of Guderian and other German Generals. The Soviets now view one of their options as a blitzkrieg-like conventional attack. In such an environment, in order not to inhibit the main lines of attack, CW must be highly selective and discriminating, striking on the flanks as well as deep at airfields, seaports, command and control facilities. The SS-23 of course, with the increased accuracy it will have in the 1990s, is ideal for such purposes.

Some experts argue that the Soviets in order to avoid a nuclear response might refrain entirely from CW use in the conventional phase of a conflict. It can also be argued that even today our unitary weapons, while a dwindling asset, do have some remaining deterrent value.

Ture, indeed, but I would respond quite simply that in the 1990s, without binary production, unitaries will lose their remaining limited deterrent value, and that, a nuclear tripwire in response to Soviet chemical use is just not a viable or proportionate strategy. It also contradicts the very essence of the NATO strategy of flexible response.

It is important to note, I think, that despite the lack of full agreement among experts on when and how the Soviets are likely to employ chemical weapons offensively, the fact remains, and experts agree, that the Soviets have the capability to conduct widespread chemical attacks, in areas and at the time of their choosing. Admittedly, no one can know for certain whether the Soviets' intend to conduct offensive chemical warfare. However, any prudent commander must base his plans on the enemy's known capabilities and not on the hope that someone can divine the enemy's intentions which may change as the battle progresses.

The probability that the Soviets might use their massive chemical attack capability was assesed by the Chemical Warfare Review Commission, headed by Ambassador Stoessel. The Commission concluded that it found "no reason, other than fear of retaliation, to assume that the Soviets would not use chemical warfare if they judged it to their advantage to do so."

The Soviet chemical threat to NATO's nuclear option is of particular concern to us at NATO. Chemical attacks on NATO's theater nuclear-capable forces and stockpiles could prevent their timely and efficient use and, thereby, diminish their deterrent value.

The Alliance is working hard to raise the nuclear threshold and provide a viable conventional deterrent. The staunch leadership provided by Lord Carrington, coupled with SACEUR's continued urging for defense improvements, are essential ingredients to that progress. Key congressional leaders like you, Mr. Chairman, are also playing a critical role in NATO's progress.

The continued absence of a credible chemical weapons retaliatory capability, however, jeopardizes the immense investment in conventional defense improvements made by the U.S. It also threatens to make the Alliance's substantial progress in this area irrelevant. For a small percentage of that original investment the Congress can buy an insurance policy on its commitment to conventional defense improvements. This would certainly be a force multiplier—an investment multiplier—of what the Congress has already invested in our conventional defense improvements.

As members of this Subcommittee know, the U.S. Congress provided strong leadership when it took decisive action to appropriate FY86 funds for binary weapons production. I commend the Congress for that action, and I would like to take this opportunity to provide you with an update on the status at NATO of some of the major provisions in the FY86 legislation.

First, a fundamental point: we are not suggesting some new doctrine. NATO recognizes the necessity of a modern Alliance chemical weapons deterrent. The Alliance's approved strategy states that the NATO should rely principally on its conventional and nuclear forces for deterrence. It also states that as an additional deterrent NATO should possess the capability to employ lethal chemical agents on a limited scale in retaliation. Within this context, Allied leaders support the modernization program Congress has approved.

But we have tried to avoid having this issue become a political football in Europe, as did the enhanced radiation weapon and the way it was demonized. During the authorization and appropriation process last year many—including some of you here—worked with us to develop language which would avoid this. In the final analysis, it is, in fact, wholly a U.S. decision to produce binary weapons. Additionally, binaries are rapidly deployable in a crisis and deployment is being built into our plans for reinforcement of Europe, if warranted by the threat, or the fact, of an attack. So when binary production offered us these advantages, it just did not make sense to politicize the issue. What did make sense was to use existing NATO machinery to move forward in a professional way—by asking NATO to adopt a force goal, in the same way as any other force goal would be handled. By way of explanation, let me briefly state what a NATO force goal is and leave with you a detailed paper on it.

The Major NATO Commanders, (SACEUR, General Rogers, SACLANT, Admiral Baggett, CINCHAN, Admiral Hunt, UKN) effectively begin the process by formulating force proposals after consultations with nations. The NATO Military Committee then reviews and approves the force proposals, and forwards them to the political side of NATO.

As a matter of fact, NATO consideration of the force goal requiring U.S. binary production is underway. On February 13, the NATO Military Committee approved the package of force proposals, including SACEUR's CW force proposal for the U.S.

The Defense Review Committee, or DRC, now must examine the Military Committee's force proposal package for each NATO nation with regard to financial, economic, and political implications. This review, which includes both bilateral and multilateral consultations, ensures compatibility with guidance previously given by Ministers. For this year, by the way, review by the DRC should be completed by May 1986. The DRC then forwards the proposals, as draft force goals, to the NATO Permanent Representatives for consideration. This next step in NATO's consideration of the draft force goals asks that the Permanent Representatives, meeting as the Defense Planning Committee, or DPC, "adopt" the draft force goals. Defense Ministers, meeting as the DPC in Ministerial Session this May, will be asked to "note" the Permanent Representatives' action. Adoption by the DPC Permanent Representatives and noting by Defense Ministers completes action on the force goals.

While I am on the subject, let me point out a technical and procedural problem. The current legislation speaks of approval by the North Atlantic Council, or NAC. As I have pointed out, it is the Defense Planning Committee that has jurisdiction over force goals. Because it is the key to understanding the nuances of actions taken by NATO, let me review the distinction between the NAC and the DPC. When France withdrew from NATO's military structure in 1967, the Alliance needed a separate forum to address issues related to defense, a forum where France could not be seated. This forum was called the "Defense Planning Committee." The DPC took upon itself, with agreement of France and the NAC, the military portfolio. In matters related to the integrated military structure the DPC exercises the authority of the NAC. I recognize that the FY86 legislation, as written, requires that the force goal be formally adopted by the NAC. Adoption by the DPC would, according to the revised NATO procedures, meet the intent of the 1986 binary legislation. Therefore, the relevant Alliance body, at the highest level, will have adopted the binary force goal acting on the authority vested in it by the NAC.

The United Stated Government is still developing, in coordination with SACEUR, the plan for contingency deployment of binary munitions in a crisis situation. We have already heard some Allied views on the content of the plan, and we will consult formally with the Alliance once the plan has been completed. By the time the President makes his report to Congress, on or before October 1, 1986, we will have conducted full and positive consultations with Allies on all issues relating to the CW modernization program required by the Congressional Legislation.

Before concluding my formal testimony, Mr. Chairman, I would like to provide you with my own view of what the consequences might be, if, for whatever reasons, the United States fails to produce the binary munitions appropriated in the FY86 Legislation.

First, it might send an undersirable signal to the Soviets. It would remove the most important incentive which the Soviets have to move at Geneva towards elimination of chemical weapons worldwide.

Second, failure to produce binaries would be fiscally imprudent. It would place at risk hundreds of billions of dollars in U.S. funds spent on conventional defense programs. I, thus, find mistaken any arguments that under Gramm-Rudman-Hollings legislation an appropriate savings could be gained by striking binary funds. Striking such funds would help undermine what the Senate and House have invested on conventional defense improvements.

Third, failure to produce binaries would also cause a loss of momentum on many of NATO's conventional defense improvement programs. Failure to produce binaries would constitute the first defeat of a NATO program in the Congress since the turnaround, which began in 1984, both at NATO and in the Congress, to ensure that, in Senator Nunn's terms, there would be no extended tripwire in NATO.

Finally, failure to produce binaries would deprive our American forces of an asset they need in order to balance the threat from the cooresponding asset already integrated into the forces of their likely enemy. In a crisis, when the reinforcement of Europe is approved, I think it would be asking too much of our troops to go to Europe without a credible chemical deterrent which can be more safely moved and employed.

I strongly urge your support for the funds requested by the Department of Defense for this program, which is so critical to NATO overall defense posture.

I am so pleased that General Jack Merritt, formerly Director of the Joint Staff of the JCS and now our able representative to NATO's Military Committee, is with me today. We work very closely together to get better output from your investment in our Alliance.

ATTACHMENT TO THE STATEMENT BY AMBASSADOR DAVID M. ABSHIRE, U.S. PERMANENT REPRESENTATIVE TO THE NORTH ATLANTIC TREATY ORGANIZATION

NATO'S FORCE GOAL PROCESS

NATO's primary planning process is based on force proposals prepared by the major NATO Commanders (Supreme Allied Commander, Europe—SACEUR; Supreme Allied Commander, Atlantic—SACLANT; and Allied Commander in Chief, Channel—CINCHAN). These force proposals, which become force goals after adoption by the Defense Planning Committee meeting in Permanent Session, are a focus for national planning related to NATO defense matters, drawing national and Major NATO Command planning closer together.

The force goal's process extends over two years. Following the adoption of Ministerial Guidance (a document similar to the defense guidance of DOD), the Major NATO Commanders prepare proposals for military capabilities that they believe should be provided by the nations to enable their commands to carry out their NATO mission. The preparation of these includes consultation with the involved nations from the outset.

A force proposal is a statement of a requirement addressed to a nation by a Major NATO Commander. The requirement can be stated in quantity and/or quality, can be for implementation during the six year planning period or beyond, can be very specific or require a study of the results which should be implemented, and can be directed at force structure or any other element of military capability, including readiness standards, availability, and command relationship.

After completion, the Major NATO Commanders submit their packages of force proposals for each nation with rationales to the Military Committee. (The Military Committee is the highest military authority in the Alliance. It is composed of representatives of each member nation except France. France, however, maintains close liaison with the Military Committee.) The Military Committee considers the proposals from an Alliance-wide military point of view, eliminating overlaps, identifying interdependencies, reconciling conflicting claims, and establishing overall NATO priorities. This is accomplished with appropriate coordination with the nations involved.

The Military Committee sends its force proposals to the Defense Planning Committee (DPC). (The Defense Planning Committee is the North Atlantic Council (NAC) without France. It has the full power of the NAC and exists solely to permit the Alliance to conduct its business on a range of subjects in which France has chosen not to participate.) The Defense Review Committee, acting on behalf of the

DPC, examines these proposals from the standpoint of political-military, financial and economic feasibility and for compatibility with Ministerial Guidance.

During this process the nations are again consulted, first in trilateral meetings with the International Staff and the NATO military staffs and then in multilateral meetings of the Defense Review Committee with these staffs and representatives of the other nations.

At the end of this examination, the Defense Review Committee has turned the force proposals of the Military Committee into draft force goals. These are not a simple projection of known national plans, but strike a balance among the military requirements of the Major NATO planning and give the nations a reasonable challenges for allocating and applying resources.

The challenge asks a nation to provide resources to implement the entire package of force goals developed for a particular nation, those that are already in national plans and those that are not. Therefore, the challenge will include all expenditures of resources—financial, political, social—required to obtain the desired military capability. The challenge is not designed solely to meet those force proposals that are not in national plans; neither is it designed to achieve the target of increasing national defense expenditures by 3 percent real growth on an average annual basis over the six year planning period, as set forth in Ministerial Guidance.

On the basis of a report from the Defense Review Committee and an assessment of the risks associated with the packages of draft force goals, the Defense Planning Committee in Permanent Session deliberates on and adapts these goals as NATO force goals. On their adoption, these NATO force goals are sent to each nation for implementation. Shortly after receipt of the NATO force goals, the nations submit to the Alliance their force and financial plans for the next five years, taking into consideration the force goals. These submissions of national plans occur annually, although force goals are adopted only every even-numbered year.

The Defense Review Committee coordinates the review of these plans through a series of examinations, culminating in a report to the Ministers each fall. Part of this report is the Military Committee's assessment of the degree of military risk associated with the capabilities being provided by the nations to the Alliance and an overall appraisal by the Secretary General, presenting his personal view on the state of the Alliance. This procedure results in a five year defense plan for the Alliance, which includes firm national commitment of forces for the first year, and provides an opportunity to consider the effect of national actions, including implementation of force goals, on alliance security.

Senator WARNER. Let me make a quick followup at that point, Mr. Ambassador.

It would be helpful to those of us who are proponents of this program on the floor to be able to quote from our record today your impressions of, and I will characterize it thusly, the transition forward in the last 12 months amongst the allies—I don't think we need to be specific; I think you can be general—in their thinking that this category of weaponry is needed.

When we examine NATO's, should we say, chain of deterrence, going all the way from the most severe nuclear capability down to the sidearm, or the rifle, it can be no stronger than its weakest link.

Ambassador ABSHIRE. Absolutely.

Senator WARNER. And, at the moment, CW deterrent is the weakest link. By virture of that weak link, you put a disproportionate emphasis on other elements of deterrence—as you call it, the "tripwire"—in terms of the nuclear component of the deterrence. And I suppose it would require greater conventional war capability to offset the Soviet potential for CW usage.

So we have to strengthen that link. Otherwise the chain will pull apart.

What can you provide us this morning as to the sentiments within the circle of ministers—and the general, I am sure, can talk to the military side momentarily—as to what has been this transition forward? I say it is a transition forward. I presume you agree.

Ambassador **Abshire**. Absolutely, Mr. Chairman.

There has been a transition forward.

Let me say that when we were involved over a year ago in our then 4-month-old conventional defense improvement effort, the most extensive examination of conventional defense that has been conducted in the alliance since 1950, originally CW was on that list of critical deficiencies. Then it was decided, since these have been characterized as mass destruction weapons by some, that this would be handled separately.

But it was interesting to me that all DPC powers, but one, which had this definitional problem, wanted to include it in that list of critical deficiencies. Then it was determined to handle it separately.

At the press conference with Defense Ministers, Lord Carrington spoke of the importance of this issue, as he did before Defense Ministers.

So, Mr. Chairman, we run into that anomaly of people knowing that it should be done and not liking to take a lot of political heat on it.

On the investment side, because of the investments that are being made in the conventional defense improvements leaving a tripwire in the CW area undermines that other investment. And in the year of Gramm-Rudman-Hollings, failure to fund binary production would invalidate any ideas of trying to spend our money in a more efficient fashion. It would be an inefficient way to get at this. It would fail to lower the nuclear risk. It would, indeed, Mr. Chairman, as you say, cause a considerable, an enormous jump in conventional defense to offset that chemical deficiency.

So, it is the worst of both worlds, both with regard to the CW area and with regard to throwing us to nuclear use early-on, which we have all been striving so mightily to get away from.

Senator **Warner**. If I could return again to asking you to generalize, is it your perception now that within the defense structure in Europe, both civilian and military, there is a recognition that the steps having been taken by the Congress last year are in the right direction and that we should continue with their program, which is requested by the President this year, and that they pragmatically recognize now the necessity for eventual formal action in whatever manner you have outlined here today and the technical steps that have to be taken?

Ambassador **Abshire**. That is correct, Mr. Chairman. At our NATO headquarters, we do have certain countries with political concerns. As you know, for example, Norway does not have nuclear weapons on its own soil, and we have certain concerns that we move forward on the process and that they not politicize the debate. When you get to the professional side, there is a clear recognition of this deficiency.

Senator **Warner**. There is a momentum forward, then?

Ambassador **Abshire**. There is a tremendous momentum forward.

Senator **Warner**. And any modifications by the Congress to this program, that is, retraction of what the President requested, would certainly slow that momentum or, in fact, halt it. Would that be correct?

Ambassador ABSHIRE. It would slow it. It could halt it, Mr. Chairman. I could not guarantee that we could start it again, having progressed so far this time.

Senator WARNER. That is what I wanted to hear your opinion about.

Thank you.

Mr. Chairman, did you have a question?

Chairman GOLDWATER. Yes, I have a question, and if you cannot answer it in this unsecured room, let me know.

A few years ago, when I was with the Intelligence Committee, we had several briefings on chemicals that the Soviets possessed. At that time, there was really no concrete evidence, but we were told they had chemical agents, that were immune to any of our known protective devices.

Have any of you gentlemen heard anything that might update that information?

I say that because it was very frightening to us to believe that we had no clothing that could prevent the penetration of certain Soviet chemicals.

Dr. WELCH. Sir, I would like to respond to that.

We share your deep concern about new, unknown, Soviet chemical agents. Indeed, you asked earlier about the $800 million we were spending on defense. We have oriented that program to respond to this new Soviet threat.

The difficulty lies in the inability or difficulty of designing defenses against something which is unknown. They have had an R&D goal for at least a decade of defense defeating agents, or protecting defeating agents. We have known that and we have shared that with you.

They have demonstrated in the agent use in Afghanistan agents with resulting symptoms in Afghan people that we are not familiar with. We are very concerned that they have reached the advanced R&D stage, maybe even the fielding stage, of these agents.

They have, thereby, upset the balance that we had hoped to reach. If they do, in fact, field chemical munitions containing agents that will defeat our defenses, we are going to have to respond in some manner to redress this imbalance.

I will be able, in the closed session which follows, to give you more details about this.

Chairman GOLDWATER. The reason I bring this up—and, again, if it cannot be properly answered in an unsecured room, we can change that. I think if we could make known to the American public the details of some of these chemicals that we have only heard more or less rumored reports of, it might help us get over the very strong feeling against chemical warfare of any kind being adopted by our own forces.

As long as an American feels that a soldier can put on some kind of chemical repellent suit and live through it, they do not particularly care. But if they can be convinced that there is no such suit made that can resist Russian chemicals—and, frankly, I don't know of anybody who can sit down and talk about them—it would help our case.

Senator **Warner**. That is a very valid point.

Chairman **Goldwater**. If what I am talking about is true, if there is some way you can sanitize it to the point that we could make the American public and our NATO allies aware of what we are really looking at, it would be useful. I know that we had one demonstration here of a pilot trying to put his flight suit on and get oriented for a flight when these chemicals were coming at him. That guy would never get the switch turned on. It's a great suit, except it had a great big hole, all over, around his head area.

Senator **Glenn**. He had trouble getting around the hearing room that day, let alone fly a fighter.

Senator **Warner**. I think, Mr. Chairman, that is probably the most cogent point that has been put forward, because the threshold of this whole issue is the fairness of us, as a government, the Commander in Chief, the President, in placing our men and women of the Armed Forces in various places of the world, must not only provide them with the protective equipment to the best of our technical ability, but with that deterrent would hopefully deter any use of this classification of weaponry, either in the NATO threater—and we tend to focus on that, Mr. Ambassador, obviously—or in other places of the world.

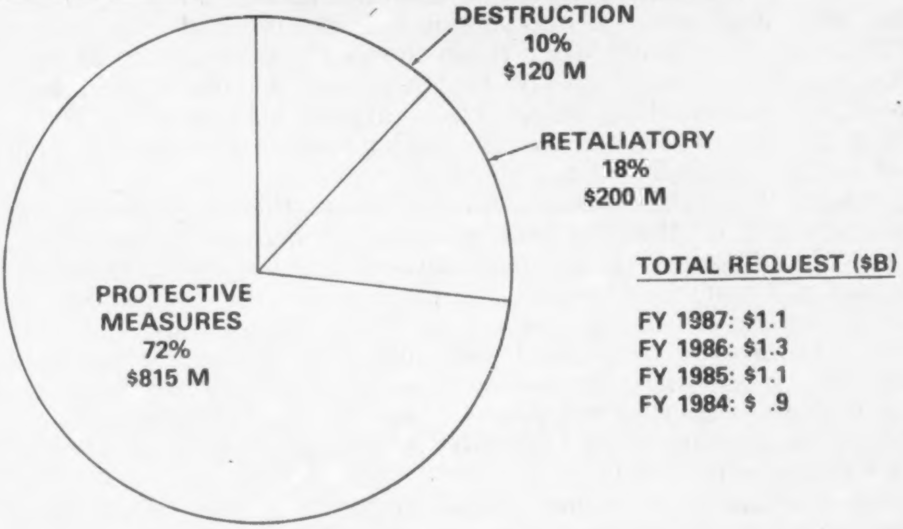
There certainly are other places in the world in which these weapons might be infiltrated by various means and used against our Armed Forces. So it is an element of fairness, the manner in which we treat the men and women who volunteer to go abroad and defend this Nation and our allies.

Senator **Glenn**. Mr. Chairman, may I ask a question?

Senator **Warner**. Yes. Senator Glenn.

Senator **Glenn**. May we go back to that first pie chart you had on the expenditures and what they were going for, the 70 percent for protective equipment and so on.

FY 1987 CHEMICAL WARFARE DETERRENCE PROGRAM



I am just rasing a question about our priorities here. The first priority to me is that we get an early retaliatory capability so that we prevent them from ever using chemical weapons to begin with. That is A-1 to me. Hopefully we will never need the protective measures.

Now I don't know whether this indicates our orders of priority or whether this just happens to be that protective measures are more expensive and we are spending as much as we can, right now, on the production of binaries and so on. If that is not the case, and if we are budget limited, and we have to make a choice on whether we are going protective measures or whether we are going to get the actual retaliatory capability first, then I would prefer the retaliatory capability first. Then we, hopefully, never get to the point where we need protective measures. And we are only spending 18 percent on production of agents here.

I just question this whole issue. I want to get the weapons in place first, so that they know we have a capability.

If we spend all our money on protective measures, instead of spending it on weapons to begin with, then we are bogged down defensively with our protective suits and thus leaving them free to start a chemical war.

So I just question our priorities here, Mr. Chairman, whether or not we are putting this in the right spot.

We know funds are going to be constrained by the budget. We are already looking at reductions here in the committee. We don't like it, but we are having to do it.

That being the case, is all the money that we can take going into the weapon systems first?

Dr. WELCH. First, sir, I think it is an excellent point and observation that you have made. We are not dollar limited and we are not putting the majority of our funds into protection unnecessarily.

We do have sufficient funds for the binary production. Our request, if honored, will satisfy that need. We will get the weapon systems we need to deter.

What will not go away, however, is this need to protect.

Senator GLENN. I agree.

But is the priority on getting our weapons up to what they should be first? That should be our absolute No. 1 priority with me.

Dr. WELCH. At this point in time, I agree with you 100 percent. Really, that is the discussion we are having this morning. It really is what can we do to get this deterrent capability, this retaliatory capability, in the field.

We are requesting sufficient funds to do that. More funds would not help.

We still, especially with our no-first-use policy, must make sure that when we put our people into the field, they are not inviting targets, they do not appear without masks and overgarments, and so on, as to invite one of the nearly two dozen countries with chemical weapons to use them against us.

The emphasis on the retaliatory parts shown by this subcommittee is sufficient, together with the request the President has made, to redress this retaliatory need.

Senator GLENN. Let me put the question in a different way.

If we reallocated some of this money out of protective measures and put 50 percent of the total pie chart into retaliatory measures, would that speed up our stockpile of binaries earlier than would otherwise be the case?

Dr. WELCH. We could probably make a case that says yes. However, it would hurt the defensive side sufficiently that it probably is not the way to proceed.

The reason I say that is this. You will remember, sir, that we permitted this whole area of chemical warfare to die for about a decade. We are just now getting back to the point where we can provide minimum protection to the people we have in the fleet and in the field.

It would be disruptive, and I think incorrect, at this point to change that road, that path. We are getting underway with the retaliatory capability. We are asking, I think, for sufficient funds to move out smartly and wisely.

Senator GLENN. But if those funds are not provided in the numbers and the amount that you are asking for, would you advise putting some of the protective measures money over into weapons production?

Dr. WELCH. Yes, sir.

If I may, after saying yes to that question, I would also urge you to take a look at the requirements to reduce expenditures from the point of view of what is needed throughout the Defense Establishment, and go back to what Ambassador Abshire said a moment ago about the importance of restoring our chemical capability in this continuum of deterrence.

Senator GLENN. Are the congressional restrictions—not just what we did in this committee and in conference with the House on authorization, but the things that you also included in the next chart that you showed, where the Appropriations Committee also put in some restrictions—that we did not have anything to do with here, that were included on your other chart—I have three of them which they approved that we did not, that is, the Appropriations Committee put them in.

One was requiring NATO to formally approve a force goal stating a requirement for modernization of the U.S. portion of the alliance's chemical deterrent with binaries. That came out of the appropriations process, didn't it?

Dr. WELCH. Yes, sir.

Senator GLENN. Another was money for production of Bigeye bombs was fenced until the Secretary of Defense certifies it will work. I think that was another one, wasn't it?

Dr. WELCH. Yes, Senator.

Senator GLENN. Certification has to be made.

Dr. WELCH. Right.

Senator GLENN. Third was money for production of GB-2 binary is fenced til October 1986, and that fence goes off automatically on October 1, I think. Is that correct?

Dr. WELCH. After we satisfy the NATO consultations and some other conditions, and we are on track to do that.

Senator WARNER. Are we on track with the first item Senator Glenn mentioned?

Ambassador ABSHIRE. May I speak to that, Mr. Chairman?

Senator WARNER. I do not mean to interrupt the order of proceeding, but would you return to that so that we have a clear respose for this record on each of those points.

Senator GLENN. Mr. Chairman, I asked about the priorities we are putting on this and whether we are limited in money for the actual production of weapons. That is what is going to prevent the Soviets from doing anything is having the actual weapons in place. They will know they are there, and that they are going to get hit right back if they are dumb enough to use them in the first place.

That is the best deterrent we have. That is the best protecting suiting that we have, if you want to put it that way. It is far more important than anything else on the chart so far as I am concerned.

Then we have a second area of constraint, that is, what Congress has done, with all of our arguing back and forth, and these restrictions that Appropriations put on and the restrictions that came out of our authorization process.

So I am just trying to get at what is the most limiting thing to getting these things in place right now so that we really, honestly, have a deterrent instead of only this 10 percent dwindling down that was from the first chart you used.

I guess those are two questions. First is that congressional end of things and how we are doing with that and—well, just go ahead and address those points as you will.

Ambassador ABSHIRE. Mr. Chairman, if I may simply respond to the force goal issue, which is in our bailiwick—and I am going to invite General Merritt to say something here, too—your committee and the conference came up with different language which we liked better.

I would not suggest now trying to go back to that language since we are involved in the force goal process and I think the only element that we have is the slightly awkward phrasing of it which this committee and the House committee can easily correct.

So, with regard to that process prescribed by the Congress, we are, one might say, halfway through it. Since General Merritt is on the Military Committee, he is on a committee where the representatives, by and large, report to their Chairman of the Joint Chiefs of Staff. This is a professional group, and I think it is interesting the unanimity that was received in that committee when you get to that professional military level.

Senator WARNER. Before the general begins, I wonder, Senator Glenn, if you would restate the first condition on your list that was incorporated in the appropriations bill.

Senator GLENN. I believe this is correct, and all of the gentlemen here substantiated this a minute ago. What came out of the appropriations process that we did not put in in our process—so they were additions—was, No. 1, a requirement that NATO formally approve—I think those were the words—a force goal, stating the requirement for modernization of the U.S. portion of the alliance's chemical deterrent with binaries. It was their requirement to say that we need modernization and to state that before we go ahead.

I believe that is correct. That came out of Appropriations.

Ambassador ABSHIRE. That is correct.

Senator GLENN. Then, No. 2 was——

Senator WARNER. Before we get to No. 2, let's take No. 1 and address it for the record.

I would ask the Ambassador or the general for his response to that requirement.

Ambassador ABSHIRE. We are well on the way. We have been through the Military Committee. This will be addressed by the DRC and the Permanent Representatives before the Defense Ministers meet in May.

The language of the Permanent Representatives is that they adopt force goals. It is semantics, but it is "adopt" and not "approve." That is another thing that could be corrected, as well as the reference from the NAC to the DPC.

But we are well underway in this requirement.

Senator WARNER. What is the timeframe for completion?

We may have this authorization bill under floor consideration within 6 to 8 weeks. This question has to be answered.

Ambassador ABSHIRE. We would aim at the force goal process of adoption by the Permanent Representatives and noted by the Defense Ministers, completed by their meeting on May 22. That part of it would be completed.

Later, the deployment plan will be briefed to General Merritt's Military Committee, which is another Appropriations Committee requirement.

Senator GLENN. Will that take care of the requirement for "formal approval?" Those are the words.

[General Merritt nods affirmatively.]

Senator WARNER. You are nodding your head and that does not help us in the record, General. You see, I have to deal with this record in black and white on the floor, as do Senator Glenn and other members of the committee.

General MERRITT. Shall I begin?

Ambassador ABSHIRE. Yes.

General MERRITT. Thank you, Mr. Chairman.

First, in response to the precise question, yes, adoption by the DPC and noting by the Ministers, as the Ambassador said, does constitute formal adoption.

Senator GLENN. Formal NATO approval?

General MERRITT. But the term of art, in fact, in NATO, is "adoption". But that constitutes formal approval of a force goal.

As far as where we are at this moment in this particular process, I would like to point out—and this has something to do with Senator Warner's comment about the transition forward—that this Military Committee did, in fact, on February 13 formally address the force proposals which are, in effect, the drafts of what eventually will be the force goals. The force proposals were informally addressed to the Military Committee. That was after extensive consultation, both informally with individual members of the Military Committee, and then during formal meetings of the Military Committee wherein we discussed all of the many aspects of the force proposal which had been submitted by SACEUR for the United States to modernize its chemical deterrent in NATO.

In terms of what that means with a transition forward; all of the military authorities of the alliance participating in the Military Committee—and that is the 15 nations, less France, which has only an observer, just as is true in the case of the DPC—all of them agreed to adopt these force proposals and forward them to the political elements of NATO.

They reinforced their support for the provisions of 14/3, the Military Committee document, which lays out the NATO strategy, which calls for a limited deterrent.

Senator GLENN. If I might interrupt for just a minute, I don't want to put words into the mouth of the chairman, but he is going to be out there on the floor managing this bill in about 6 weeks. Can he have a letter from Ambassador Abshire that says NATO has complied with this and they do now formally approve a force goal stating unequivocally that they want us to modernize and so on, which takes care of that requirement?

Can he have a letter because he is going to need it on the floor, I can guarantee you.

Are we that far?

Ambassador ABSHIRE. Mr. Chairman, we are midstream now. We will be much farther along at that point. It depends upon the timing. But I will give you a letter for the floor that will reflect the situation at that point.

Senator WARNER. As of that point.

Ambassador ABSHIRE. As of that point.

Senator GLENN. That's not going to do it, because the long knives are going to be out, I can tell you right now, when we get to the floor on this subject. He is going to have to be able to say that yes, NATO has formally approved it, and I have a letter here from Ambassador Abshire that says NATO has formally approved this and we are ready to move ahead. That takes care of our requirement.

Ambassador ABSHIRE. My question still relates to the timing. If the Defense Planning Committee has received it and has acted by that point, I will be able to affirm that.

Senator GLENN. OK.

Let me put it this way, then. We don't have it today but we hope to have it within 6 weeks, though.

Ambassador ABSHIRE. We hope so. It's just a matter of timing.

Senator WARNER. There is another aspect. The specific requirement, as I have read it, applies to the October 1 startup, releasing of defense funds.

As the Senator from Ohio has pointed out, while that may be a technical perspective of this current law, the feeling in the Senate would be what is the progress in the transitioning toward greater acceptability of this weapon system

I think your letter, in our earlier colloquy here, Mr. Ambassador, can reflect in a very positive sense that transition. Am I not correct?

Ambassador ABSHIRE. That is correct, Mr. Chairman.

I would anticipate, if we stay on schedule at NATO, that by the time you are on the floor with the bill, the DPC will have adopted the force goals.

Senator WARNER. We will keep you advised as to the timing here of floor consideration. Perhaps you can persuade Lord Carrington to get that process to move along.

Ambassador ABSHIRE. I will endeavor to do so.

Senator WARNER. Thank you.

Thank you, Senator Glenn. Had you finished your questioning?

Senator GLENN. I have a couple of others here.

The money for production for Bigeye was fenced until the Secretary of Defense certifies it will work.

Are we going to be prepared to have that certification when we go to the floor in 6 weeks?

Dr. WELCH. Yes, sir, you will.

Senator GLENN. We will. OK.

How about the third one that they put in which we did not have anything to do with, the money for production of the GB-2 binary artillery shell is fenced until October 1, 1986. The fence will go off automatically, as I understand it. Is that your understanding of it?

Dr. WELCH. Yes, sir, it is. As we certify that we have satisfied these conditions, we are going to start spending in 1986.

Senator GLENN. OK.

I am just trying to line these up so that when we go to the floor with these things, we will not be getting blindsided with having some things not met.

Senator WARNER. That is very helpful, Senator.

Senator GLENN. I can tell you that it is going to be tough on the floor this year.

Dr. WELCH. We will keep you up to date on it.

Senator WARNER. I think we should allow the General to complete any observations and contributions he wishes to make and then receive the testimony of our former colleague, Mr. Emery.

General MERRITT. Thank you, Mr. Chairman.

I would just underline a couple of points made by Ambassador Abshire in his opening testimony. This has to do with the impact of not modernizing these weapon systems from a military point of view.

The lowering of the nuclear threshold; the threatening of all of the advantages we have been able to gain in conventional defense and the views that we have established in the alliance over the past year or so in the conventional defense initiative; all of that would be a tragic loss to the alliance and a tragic loss to our military capability, and a tragic loss to our deterrent capability.

It is just a simple military fact that if we do not have a retaliatory capability we are not able to deter the Soviets. Even the simplest use of chemical weapons on the battlefield, perhaps the use of one demonstrative weapon would likely force a prudent commander to put all of his forces in full protective gear thus lowering our capability by a factor of perhaps 50 percent on the conventional battlefield, while the Soviets would not suffer that same penalty in their military capability.

That is an extremely important, simple, blunt fact about the military balance and the potential conventional war in Europe, the one we don't want to have because we want to be able to deter it.

This year is so critical to us in terms of maintaining our conventional deterrence in Europe in a way that is very difficult to describe.

I would also say with respect to your question about what has been the transition forward in the past year. As I pointed out, the Military Committee did adopt the force proposal and pass it on to the political authorities. It did it with unanimity.

Senator WARNER. Give us a date or time for that, please.

General MERRITT. On February 13 of this past year, at a formal meeting of the Military Committee, we accepted——

Senator WARNER. Excuse me—of this past year?

General MERRITT. On February 13, 1986, the Military Committee met in a formal session, reviewed the force proposals, and adopted them, including SACEUR's force proposal for the modernization of the chemical capability of the United States of America, and it was forwarded to the political authority.

Senator WARNER. Can you share with us some of the language that was incorporated into that recommendation? Was it forceful and strong? Was there some equivocation? Was there some dissent?

General MERRITT. There was no equivocation, understanding, however, Senator, that when you forward the force proposals, you are forwarding, literally, hundreds of force proposals for various nations.

The chemical weapons force proposal in the first place responds to court NATO strategy. That was my argument and discussion with all my colleagues—with which they absolutely agree. Singling that force proposal out was not deemed necessary. The only place that we single our issues is where the force proposals didn't follow ministerial guidance in some way. In fact, I did insist that we should point out that it was important that we do better work with conventional munitions and some things of that sort.

But this force proposal was not singled out.

Dr. WELCH. But it was unanimous?

General MERRITT. It was unanimous, sir.

Senator WARNER. How did this particular action of that committee differ with respect to this category of weapons from the year before and perhaps the year before that?

General MERRITT. Mr. Chairman, that force proposal in its form was never before presented to NATO because it was never considered to be a necessary thing to do. It was presented or brought into NATO because the Congress of the United States put it into legislation.

Senator WARNER. That is the point I am getting at. It was a direct response to the action of the Congress of the United States. It was a first impression—is that correct?

Seneral MERRITT. It was, indeed, Senator.

Senator WARNER. Thank you.

Now, we would be glad to hear from you, Mr. Emery.

Ambassador ABSHIRE. Excuse me, Mr. Chairman, but may I just make a couple of additional points?

Senator WARNER. Yes.

Ambassador ABSHIRE. I realize some of this has to do with the Appropriations Committee and Appropriations Committee conference.

I would assume that it was in no way the intent of the Congress to rewrite NATO procedures, that where we find a slight language problem, that is an inadvertency, and there is no legislative intent to change a procedure.

For example, Senator Glenn noted adopt or approve the procedure on a force goal. It is adopted, it is not approved. Also, the NAC versus the DPC, which I have explained. I just want to point out for the record that I am assuming that were we to run into such inadvertency, there is no intent to force the North Atlantic Council into a new procedure. The intent was to follow its procedure and to have the binary component to go into that regular procedure.

Thank you, Mr. Chairman.

Senator WARNER. That would be my assumption, Mr. Ambassador, but it would have to be verified and confirmed by members of the Appropriations Committee, who actually wrote that section.

Senator GLENN. Mr. Chairman.

Senator WARNER. Senator Glenn.

Senator GLENN. I do not want to beat this to death, but I do want to be very, very clear on the record for us when we go to the floor.

I look at it in this way: that the best protection that the United States can have and that our forces in the field can have by far is to have weapons ready to go. This is the best thing we can have out there.

Now, to get the earliest operational date for those weapon systems, are we dollar limited now—that is number one—or are we congressionally limited by the restrictions we put on?

Are we dollar limited now? Would more money help us get an earlier operational date?

Dr. WELCH. The answer to that is no, sir. More money in later years would help us get the stockpile to where we want it faster. There is nothing we can do this year with fiscal year 1987 funds to accelerate those fielding dates.

Senator GLENN. Beyond the 18 percent you have on the chart?

Dr. **Welch**. We could get there, to that 20-percent binary target, faster, but only if funds were applied in later years.

This year, keep in mind that we are ready to move out with the 155 mm binary and chemical artillery projectile in October; we are still finishing up the operational tests for the Bigeye bomb and that will not be ready for production until a later date. I think we are doing everything with fiscal year 1987 dollars in our request that will get us the munitions into the field at the earliest possible time.

We are not dollar limited.

Senator **Glenn**. All right.

Are you being unduly restricted by Congress?

Dr. **Welch**. That is more difficult to answer. In general, no. we are pretty much on the schedule that we had intended before the restrictions were put in.

Senator **Glenn**. OK; that is a good point.

If we have to cut under Gramm-Rudman, where would you recommend that the cuts come from out of the pie chart that you had up?

Dr. **Welch**. I would first recommend that they not come out of anyplace in that pie chart.

[General laughter.]

Senator **Glenn**. Oh, I agree.

Dr. **Welch**. And I say that with respect, sir, and with regard for the problem you have. But I would go back to something you have said repeatedly and which the subcommittee has said repeatedly, and that is if there is one area where we need to redress the imbalance with the Soviet Union, it is in this area of chemical weapons.

We have looked at this program carefully, as well as the General Accounting Office, as well as subcommittees, and we think it is a good one.

If there is one money point to be made about the chemical program, I think that it is a tremendous investment in insurance. The hundreds of billions of dollars that you have authorized over the last few years for conventional defense are at risk if we simply cannot use them.

This is a very cheap way of restoring it, or insuring that investment.

Ambassador **Abshire**. Mr. Chairman, could I add one final point, and I will promise not to ask for another one?

Senator **Warner**. Mr. Emery, by virtue of his experience in the Congress, knows patience well.

[General laughter.]

Ambassador **Abshire**. Thank you.

Mr. Chairman, to clear up just a slight ambivalence occasionally on my part, let me say that some NATO nations would have preferred that the executive and legislative branches act, make their own decision, without going through NATO. Those nations tell us, their representatives, as came out in the Military Committee, that they see the need. They would have preferred that, since this is our decision on production, we move forward on that basis. When we had the Skelton amendment in the House, that, of course, greatly worried them because that would have forced them into a great political debate.

So, when we had first the Appropriations Committee conference language, that got us on much sounder ground—excuse me, the authorizing language. And then, in the Appropriations, we moved toward the force goal, which was certainly preferable.

But I would like simply to footnote my response and say they see the need. Since the binary production was an American decision, I think some of them would have preferred to keep it on that basis.

Senator **Warner**. Yes. But our whole concept, almost entirely, is one of forward deployment. We have to look at where we are in that.

Senator **Glenn**. I don't want to continue this on into the night, but I must say this. NATO really wanted this, but they just did not want to talk to their people about it—very basically. I do not expect you to acknowledge either yes or no on that. That was my opinion, from here.

You are in a different position than I am in. They did not want to bring it up and get a big discussion started, but they really wanted it because it is safer for them. It is safer for them because of the stockpiles over there.

My big objection to including NATO in this whole thing was NATO is not necessarily going to be the only spot in the world where we may need our weapon systems. We don't give NATO a veto power over whether we are going to put in another carrier task force. We don't give NATO veto power over whether we are going to have 16-inch guns or SAM missiles.

And yet, in this instance, we are developing a weapon system and virtually giving NATO a veto power over what the United States will build for our own use anywhere we want to use it—NATO included.

I think that was just dumb. I have never seen us do anything like that in any other weapon system. If we feel we need it, we feel we should be building this thing, and NATO should not have a veto power over it.

The people over in the House used it quite the other way. They wanted to give NATO a complete veto power. We worked around all this weasel-worded language that we finally put into this thing to make it as palatable to everybody as possible. And it is a very sticky area here that you are trying to operate in with all, as you pointed out, of the imprecise language that we've put in.

But, I'll tell you, the imprecise language was preferable to what we started out with around here. So you are better off than you would have been otherwise.

Senator **Warner**. The point is well taken, Senator Glenn.

We will now hear from Mr. Emery.

STATEMENT OF DAVID F. EMERY, DEPUTY DIRECTOR, U.S. ARMS CONTROL AND DISARMAMENT AGENCY

Mr. **Emery**. Thank you very much, Mr. Chairman.

In the interest of brevity, I will submit my statement for the record and proceed extemporaneously with a few observations.

Let me say at the outset that the Arms Control and Disarmament Agency believes strongly in the binary program. There are several reasons for that.

Obviously, it may strike some casual observers as a bit inconsistent that we, a disarmament agency, are in favor of a military production program. But, indeed, we are concerned about two aspects. One, as very ably mentioned by my colleagues here at the witness table, is the concern for the deterrent capability of the U.S. military force.

As we have seen from Dr. Welch's charts, it is quite evident that our CW deterrent capability has been degraded over the last 15 or so years, as our own production has ceased to exist, as the existing arsenal has become older and less reliable, and, of course, coupled with the growing numbers and varieties and capabilities of the Soviet chemical arsenal. We have every reason to believe that our deterrent capability has been severely degraded and that we need to take action.

The President has identified two ways that we can redress this problem. One is, of course, to phase out the old, incapable, inefficient weapons in our arsenal and replace those with newer, safer, more accurate weapons, such as are in the binary program.

The second strategy, of course, is to sit down in Geneva, not only with the Soviet Union but with the other nations of the Committee on Disarmament, and work out a comprehensive treaty to ban and eliminate the production, use, and storage of chemical weapons of any kind anywhere in the world.

This is precisely the administration's policy.

Senator WARNER. Would you describe that as a parallel track?

Mr. EMERY. Absolutely it is. It is a parallel track or a dual track, as you wish to characterize it, and it is designed to address the two problems that we have to deal with. One is the deterioriation of our deterrent and the second is to find a strategy that will encourage not only the United States and the Soviet Union, but all other CW capable nations, or those that may aspire to a CW capability, to negotiate an elimination of those weapons.

I would have to point out for the record, Mr. Chairman, that we believe very strongly—and we think history bears us out—that without attention to the first problem, the second will not come about.

I think we need to understand that, if we take a look at the history of our negotiations with the Soviet Union, I simply cannot think of an instance where the Soviets have unilaterally given up a massive military advantage just simply out of goodness or kindness.

The fact of the matter is it is a tough situation. But, unless our negotiators can sit down with the Soviets and show them that the alternative to a comprehensive ban on these weapons is to face the same kind of retaliatory that the Soviets will simply give up that sort of arsenal.

The question is often asked now that there has been some movement in the Congress on binary production, what has the Soviet response been? I think it is important to understand what that response has been and where we expect it to go in the future.

First of all, we faced the usual strong language, very strong polemics from the Soviets, after the votes of last year, and at that time, the Soviets slowed down, almost to a halt, the discussions on banning chemical weapons. Thus, the CD showed no progress.

However, after a period of time, when the Soviets began to realize that the U.S. Government and the Congress was serious about redressing the shortfalls in our CW arsenal, they came back to a more serious level of discussion. During that period of time we have noticed, continuing to this very day, that the Soviets have ceased their description of the binary weapon as a new, provocative kind of chemical weapon and now have referred to it technically rather than in terms of "arms race polemics."

We also note that at the Reagan-Gorbachev summit of last November, the two sides agreed to expand the level of discussion with a view to understanding ways to limit the proliferation of chemical weapons in dealing with other matters as well.

So, I think we have seen the transition, very predictable, in Soviet response to arms control. When they believe that we are serious, they will negotiate seriously. They will maintain and even accelerate the level of negotiations.

But if they believe that we are not resolute, if they believe that they can gain a military or political advantage unilaterally, they will not negotiate seriously. They will rely on international polemics and political maneuvers, but, in fact, will not move to closing the political gaps between the two sides and maintain their advantage in that fashion.

Senator WARNER. Mr. Emery, at this point in the record, I think it is imperative that we put in, again, what has been the transition in this area. Since the action by Congress last year, have you detected a more serious approach to the negotiations as a consequence of the actions taken by the Congress?

Mr. EMERY. I think that has to be answered very carefully, Senator, because there has not been any massive progress that would lead anyone to believe that a treaty was around the corner.

However, there has definitely been a transition in the Soviet attitude and approach. The first reaction, as I stated, was polemics, was rhetorical, and it was a withdrawal from the process substantively. When they began to believe that we were serious, that the binaries would be produced, that we would modernize our stockpile, that we were serious about defensive measures, then they came back to the process, we think, with a renewed interest.

At that time, in the summit talks, there was——

Senator WARNER. Wait now, please. Let us get to the congressional action because I have to deal with this. Follow each word very carefully.

When we began, was that the beginning, the action of Congress last year?

Mr. Emery. Yes.

Senator WARNER. That was the foundation for the progress that you have described thus far?

Mr. EMERY. We believe that it is, Senator.

Senator WARNER. It directly contributed to it?

Mr. EMERY. We believe that it did. We believe that without the positive vote in the Congress, the Soviets would be no closer to any further resolution.

Senator WARNER. So you preceived a change in their attitude once Congress, so to speak, bit the bullet on the CW issue last year?

Mr. **Emery**. We believe that's correct, Senator.

Senator **Warner**. Thank you.

Please continue.

Mr. **Emery**. I think it is very important to underline that point, exactly as I believe you and the committee perceives. The price we pay for inattention to this problem will be further reducing the possibility that the United States and Soviet Union will, in fact, be able to negotiate the comprehensive ban that the administration has proposed, because the Soviets will not unilaterally give up an advantage if they perceive that they can maintain an advantage by maintaining the status guo.

If they recognize that we are serious, that we will not allow them a unilateral advantage in chemical weapons or any other area, that we will maintain our deterrent posture, then they will be forced to recognize that they must deal with the issue in a variety of ways, including at the negotiating table.

Let me say also very strongly for the record that the Reagan administration believes that it is fundamentally in our interests and in the interests of our allies to have a comprehensive ban on chemical weapons.

We are still hoping that the Soviets will respond in the conference on disarmament or otherwise to the proposal that Vice President Bush presented in Geneva a couple of years ago. There are a number of differences of opinion and approach which we believe are negotiable, and we hope that the Soviets will respond, particularly to their concerns about the so-called article X, which deals with challenge inspection.

We also note an increasing interest among various nations throughout the world in dealing with this problem. We hope that the combination of resolute approach on the part of the Congress in dealing with the deterrent problem and the production of the binary weapons, plus an increasing international consciousness, which is being raised by chemical weapon activity in the Middle East and elsewhere, will encourage the Soviets to take the issue seriously and to meet us at the negotiating table in a multilateral forum or otherwise to resolve the differences and arrive at a treaty.

We believe that is extremely important and, of course, is the cornerstone of the administration's CW policy.

I should say, in conclusion, Mr. Chairman, that there have been a couple of other issues that have been raised with respect to chemical weapons.

One is the question raised by the United States-Soviet discussions proposed at the summit dealing with nonproliferation. I should say that it is not in our interest and not the administration's policy to shift away from the negotiation of a comprehensive ban on chemical weapons, merely to attain a nonproliferation treaty.

We believe that the focus of our activity should be, and certainly is now, the completion and signing of a comprehensive ban on chemical weapons. We do not wish any nonproliferation discussions to move us away from that goal.

Second, the Soviets continue to press the concept of a chemical weapon-free zone.

I should say that although in various parts of the world it might have considerable political appeal because it is simple and easy to understand as a concept, we must keep in mind that no matter what a "chemical weapon free zone" might state as a goal or a policy, chemical weapons may be brought in or shot in to any particular area, no matter whether it is a chemical free zone or not.

We feel that the only way to guarantee that chemical weapons will not be used is to eliminate them, to guarantee that they do not exist, to destroy the production and storage facilities, and furthermore, to establish an international process whereby questionable facilities could be challenged and examined by an appropriate team of inspectors to guarantee that no clandestine facility or illegal activity will be allowed by any country, whether it is the United States, the Soviet Union, or anyone else.

Mr. Chairman, that concludes my testimony, but I would be very pleased to answer any questions that you or the members might have.

[The prepared statement of Mr. Emery follows:]

PREPARED STATEMENT OF DAVID F. EMERY, DEPUTY DIRECTOR, U.S. ARMS CONTROL AND DISARMAMENT AGENCY

I am pleased to have the opportunity to appear before you today to discuss the activities of the United States on the subject of chemical weapons arms control. This is a subject to which we attach considerable importance. We welcome the interest of the Senate.

Today I plan to discuss the several different efforts we have underway to control chemical weapons and their use. I'll touch on the use of CW in the Gulf war, review one of the key verification issues in the negotiations, and comment on the connection between the U.S. chemical weapons modernization program and the negotiations.

The three issues that the U.S. is concerned with in the area of chemical weapons (CW) arms control are: compliance with existing international agreements; checking the dangerous spread of chemical weapons around the world; and negotiating a comprehensive and verifiable, world-wide ban.

The U.S. is a party to two international arms control agreements affecting chemical weapons. The first is the Geneva Protocol of 1925, which prohibits the use of chemical and biological weapons in war, but does not preclude their development, production, and stockpiling. Additionally, we have ratified and have completely adhered to the Biological and Toxin Weapons Convention of 1972 which bans biological and toxin weapons, but does not cover chemical weapons. Unfortunately, neither one of these agreements contains the necessary provisions for delaying with problems in compliance.

We are now confronted with some particularly disturbing international trends, which cumulatively have resulted in a gradual erosion of the moral and legal sanctions against these weapons. In 1963, approximately five states had CW stockpiles; the figure has now risen to at least sixteen. The fact that incidents of use are clearly on the rise is an even more disturbing matter. Over the last several years, we have seen the Soviet Union employ toxins in Afghanistan and become involved with use of toxins by their clients in Southeast Asia. Furthermore, in 1984, 1985, and 1986, lethal chemical weapons were used by Iraq against Iran. And practically as I speak, CW are again being used by Iraq. In both of these cases we are not just talking about isolated incidents, but rather multiple violations of the Geneva Protocol. In the case of Afghanistan and Southeast Asia, the 1972 Biological and Toxin Weapons Convention has been violated as well. The United States has frequently condemned the use of CW, and will continue to do so at every opportunity.

In late February, the U.N. Secretary General dipatched an investigating team to Iran and its report concluded that on many occasions, Iraqi forces had used mustard gas against Iranian forces. The U.S. strongly supports impartial international investigations of reports of CW use, such as the aforementioned efforts initiated by the U.N. Secretary General. However, we are deeply concerned by the absence of worldwide outrage over the breaches that have been documented. While Western delegations in the Conference on Disarmament will jointly condemn Iraqi use of CW, others have remained silent. Unless countries call violators to account, the norm against CW use will continue to erode. The world is in a race against time to eliminate these weapons before they have spread beyond the point of no return.

The best solution to the threat of chemical warfare would be to eliminate chemical weapons from national arsenals. We are presently engaged in several negotiating efforts, the total effect of which we hope will result in a total ban of CW. Since 1981, our primary emphasis has been on multilateral negotiations in the 40-nation Conference on Disarmament (CD) in Geneva. We participate very actively in this work and have made a number of major initiatives. In 1984, Vice President Bush tabled a draft convention which remains the most comprehensive model for an eventual ban of CW. In 1984, as a complement to the multilateral negotiations, the U.S. and the USSR re-established bilateral talks, primarily aimed at exploring ways to ensure confidence in each other's compliance with prospective treaty provisions.

At the November 1985 Summit, President Reagan and General Secretary Gorbachev agreed to accelerate bilateral discussions on a comprehensive CW treaty and to establish a dialogue on the spread of chemical weapons. I can happily report that both of these efforts are already underway.

In late January and early February, U.S. and Soviet negotiators held intensive bilateral meetings on the margins of the Conference on Disarmament in which several key issues were discussed. The U.S. pressed unsuccessfully for clarification of the January 15 Gorbachev remarks on CW. The Soviet attitude in these talks has been business-like and non-polemical, but not forthcoming. Since the treaty would allow ten years for destruction of stocks, Gorbachev's statement that chemical weapons should be eliminated by the end of this century implies that the treaty negotiations would be completed in the next couple of years. This would require considerable acceleration of the current slow pace. The main issues which separate the two sides remain the same and relate largely to verification but we have noticed a slow advance on technical matters. We expect to hold another bilateral round soon.

The foremost issue of disagreement in the negotiations is challenge inspection. Unfortunately, chemical weapons production facilities don't look much different from ordinary chemical factories, and chemical weapons stockpiles are very easy to hide. Distinquishing between activities that would be prohibited by a CW ban and permitted activities will be very difficult at best. The U.S. continues to believe that a provision for short notice, mandatory challenge inspection of suspect facilities is a necessary component of a system for dealing with concerns about treaty compliance. A key feature of our treaty proposal is the right to demand a challenge inspection of any military and government-owned facilities, or relevant privately owned facilities to clarify suspected violations. Under such an "open invitation" arrangement, the U.S. would be permitted to inspect any relevant facility in the Soviet Union or elsewhere that was a concern to us. Likewise, the Soviets could visit any relevant U.S. facility whether or not it was directly related to CW. We recongize that this verification measure is more intrusive than those we have requested in other arms control negotiations. But we believe that because of serious problems of dealing with undeclared facilties in a CW treaty, such an unprecedented measure is fully warranted.

The U.S. believes that for a challenge inspection provision to be useful in deterring violations, it must not only guarantee prompt access into all facilities where a violation may be suspected, but it also must be conducted in such a manner as to provide a high degree of confidence that it will furnish the information necessary to determine whether a violation has occurred. We realize that the degree of access required for an effective inspection may result in the loss of some proprietary or national security information not related to CW. After all, we are talking about some very sensitive U.S. activities. While this cost can be minimized, the U.S. believes that this potential loss is a price that must be paid for an effective convention. This conclusion has been adopted at the very highest levels of the executive branch.

Although the effectiveness of the inspection is the overriding concern, we believe that in most cases effective inspection measures can be devised which will minimize the risk of compromise of sensitive information. Such measures are currently under investigation.

In early March, the U.S. and Soviet representatives met in Bern, Switzerland to exchange views on curbing CW proliferation. The Soviets explaned to us the chemical export controls they have recently instituted on certain chemicals which can be used both for peaceful purposes and for chemical weapons. We informed them of our concerns about proliferation and use of chemical weapons and the export control actions we had already taken. We made clear our view that the CW non-proliferation discussions should not be allowed to interfere with negotiations on a complete ban, which is our highest priority. The meeting was a constructive one and it was agreed to meet again once the discussions had been reviewed in Moscow and Washington. I would add that over the past year, the United States has also participated actively in an Australian-led effort to coordinate Western export controls on CW-related precursor chemicals.

Two other proposals which the Soviets have raised but which the U.S. does not think worthwhile purusing concern a chemical weapons nonproliferation treaty and a chemical weapons free zone. The U.S. has opposed the suggestions by the Soviets to negotiate a CW non-proliferation treaty. General Secretary Gorbachev suggested in Paris in October, 1985 that the Soviet Union would be prepared to take part in drafting an international accord on the non-proliferation of chemical weapons, along the lines of the nuclear non-proliferation treaty. This was a positive step since it showed Soviet concern about CW proliferation. However, we believe a formal treaty to be inappropriate. While there are some superficial similarities, the chemical and nuclear non-proliferation problems are much different. For example, the technical constraints are much weaker for CW. Additionally, the negotiation of a CW nonproliferation treaty would detract from the achievement of a global ban. A chemical weapons free zone has been suggested by the Warsaw Pact in several forums many times since 1983. The U.S. does not believe that a CW free zone would alleviate the key problems of chemical weapons. Any attempt to negotiate a CW ban applicable only to Central Europe or to all of Europe could undercut efforts in the CD to achieve a worldwide CW ban. Additionally, since chemical weapons could easily be transported into any "free" zone, verification to ensure the zone remained free would be even more difficult than verification of a worldwide ban.

I think it should be clear that we are not only negotiating actively, but are doing so on a number of fronts. Unfortunately, I must also report that we remain unsatisfied with the very slow pace of the negotiations. Despite what some newspaper headline writers would have one believe, an accord is not in hand, or even close. While there continues to be a slow advance on technical issues, the real obstacle remains continued Soviet unwillingness to deal specifically with the really difficult issues surrounding the verification of a comprehensive CW basis.

This brings me to the relationship between our negotiating efforts and the chemical modernization issue. Shortly after the House voted last summer to authorize production of binary chemical weapons, the Soviets greeted this decision with a hail of polemic followed by a silent sulk during which they virtually withdrew from active negotation. This sort of posturing did not go over well at the CD, and gradually the Soviets were subjected to more and more criticism for it. When the binary production issue continued to move through Congress, the Soviets apparently concluded that we were serious about modernization, and by the end of the CD's Summer Session, had returned to active negotiations. The Soviets have now virtually ceased mentioning binary weapons at all, and when they do refer to them it is only in a descriptive, not a polemical fashion. This seems significant to me.

I do not want to overemphasize the effect the modernization decision has had so far on Soviet actions. There have not been any breakthroughs and a great deal remains to be done before we have an agreement. Yet I think there is already some evidence that the Administration's contention that the Soviets would have little incentive to negotiate seriously until we showed the resolve to modernize, is correct.

The U.S. objective is to obtain a comprehensive, verifiable prohibition on CW that will enhance the security of the U.S., its friends and allies. Until there is such a treaty, the U.S. must protect the security of itself and its allies by maintaining an effective deterrent to CW use. Even though the Soviets are attacking the U.S. binary decision in the CD, we must continue to convince others that we are committed to the treaty process and are not, as charged by the Soviets, merely using the process as a stalling tactic for binary production. As we have explained to our friends and allies, binary production constitutes modernization, not expansion, of a modest U.S. stockpile and is essential to deter Soviet CW use in Europe. If we were to go back on our commitment to modernize, I am very much afraid that the Soviets would return to the posturing and stalling which has characterized their behavior during the late 1970's and early 1980's.

Ladies and Gentlemen, our goal is the total elimination of chemical weapons everywhere in the world. I want to assure you that the Arms Control and Disarmament Agency will do everything within its powers to work diligently and expeditiously to achieve this goal. We look forward to your advice and support as we pursue these negotiations.

Senator **Warner**. Thank you very much.

It is the intention of the Chair to proceed quickly to a few questions that are needed for the record and then to go into an executive session momentarily.

We will address the first question to you.

BINARY MODERNIZATION PROGRAM

What would be the impact on U.S. negotiating efforts if the Congress were to halt the binary modernization program this year after the positive signs that you have attributed to the decision last year to proceed with the modernization program.

Mr. **Emery**. Mr. Chairman, it is my judgment that if the Congress were to terminate the production program, it would essentially eliminate any possibility that the United States and Soviet Union would conclude a bilateral treaty or a multilateral treaty.

Senator **Warner**. I would infer from that that any partial diminution in support of the President's program could also be interpreted likewise?

Mr. **Emery**. It would be a very bad signal because it would send to the Soviet Union the signal that continuing political rhetoric, pressure, or foot dragging might lead to the termination of the United States program, and hence, the Soviets would hold out hope that they would maintain their massive chemical advantage by doing nothing.

Senator **Warner**. In summary, support by the Congress for the President's request is essential if we are to continue on this parallel track of negotiation and modernization.

Mr. **Emery**. Very clearly, Senator, if any Member of the House or Senate is truly serious on arms control, he must support the program or else the program will have virtually no possibility of success.

BIGEYE BOMB

Senator **Warner**. Now I have three questions for Dr. Welch.

First, would you respond briefly to the issues related to the Bigeye bomb raised by the General Accounting Office, and would you provide a more detailed response for the record.

Dr. **Welch**. I would be very pleased to provide a detailed response, Mr. Chairman.

[The information referred to follows:]

GAO Issues With Bigeye

In their draft report entitled "The Status of the Bigeye Binary Weapon System," the GAO presents their results in the form of principal findings and overall conclusions. I will restate each principal finding and overall conclusion, following each with the DOD position.

GAO finding: The Bigeye chemical and developmental test program presents major and continuing inconsistencies.

DOD position: GAO has asked questions and reviewed reports at every level of management of the Bigeye program. In so doing, GAO has been provided answers in various levels of detail and on diverse bases. It is not surprising that answers from engineers, program managers, and policy makers would differ based on their differing perspectives. Testing cannot be completely rigid. Objectives must change with variations in the schedule and as results of previous tests impact on the design and performance envelop of the system. We are managing the test program to validate the effectiveness of Bigeye—as a key element of our chemical deterrent. That remains our foremost goal.

GAO finding: Test criteria are ambiguous, shifting and uncertain.

DOD position: We set up the Bigeye test program to address various objectives that we determined to be important. We don't claim to have established a perfect test program, especially for a chemical weapon for which we have such a limited experience base. We established test criteria to the best of our ability. As with all test materiel entering a development test program, one never expects to meet all stated criteria on the first series of tests. In fact, we recognize that a development test program often leads to revised or new criteria or modifications of the item being tested. Instead of treating any inability to meet development test criteria as failure, we view this as another valuable data point and make adjustments as appropriate. This does not mean that we automatically lower the standard if we can't meet it. It means we reevaluate the validity of the standard based on operational, not laboratory, considerations. If changes are warranted, we recognize the need to go ahead and make them. In some cases, the testing conducted so far has now led to establishing test criteria where none previously existed. We are confident that this approach will lead to realistic criteria for the next operational test phase. The ultimate goal in the Bigeye program is to develop and field a reliable chemical weapon that will provide a key element in our chemical deterrent strategy.

GAO finding: There is a paucity of test data and analysis to resolve important technical issues.

DOD position: Tests to evaluate the mixing system, using reactive simulants in the open air, have been conducted. The mixing system has also been chamber tested using live chemical agents under a variety of temperature conditions with additional tests scheduled. The DOD believes that most issues cited by the GAO as unresolved are indeed resolved. We are planning additional tests to resolve the few remaining issues that concern us. Judgments must be made, during testing of weapons systems as to when enough data has been collected to make a decision that the system "works." We have determined that Bigeye has been technically tested sufficiently to enter operational testing. The final judgment on the system will be made after completion of that testing.

GAO finding: "Solutions" to TECHEVAL problems result in operational constraints and uncertainties.

DOD position: Solutions to TECHEVAL issues have led to more realistic operational thinking on the Bigeye. For instance, before implementing the off-station mixing (OSM) concept, the pilot was required to initiate mixing prior to release of the weapon from the aircraft. This caused some hazard to the aircraft, created a situation where the weapon could not be safely jettisoned, and made the weapon delivery problem more complex. Now the pilot can approach the target at very low altitude and high speed and loft the bomb to its target. This allows the aircraft to remain 3 to 4 miles from the target rather than overflying it as is done with unitary spray munitions. Using the FMU-140 fuze, the bomb can be lofted from its maximum range and the dissemination can begin from selectable altitudes depending on wind conditions. Thus the pilot is many times safer using the Bigeye bomb in its present configuration (OSM, FMU-140) than he was using the more restrictive tactics and a time fuze.

GAO conclusion: Testing to date has not been able to demonstrate the feasibility and effectiveness of the Bigeye.

DOD position: Testing conducted to date has demonstrated Bigeye to be an effective and safe chemical deterrent and chemical retaliatory capability. We have shown that the Bigeye can produce lethal binary chemical agent over 95 percent of its expected operational environment. We have also demonstrated that we can disseminate the agent simulant on a target area. The Bigeye is compatible with delivery systems and current tactics. We will be able to meet all reliability requirements as the various improvements determined during development and operational testing are incorporated. We are managing the Bigeye program to produce a weapon that contributes significantly to our chemical deterrent capability.

GAO conclusion: Operational testing will not address many of the unresolved critical questions which remain.

DOD position: Operational testing, independent from technical testing, views and tests the weapon from the operator's perspective. The operators are the pilots who will have to use this weapon in combat, should a decision be made to do so. They are addressing all the issues within the resources and capabilities available to them. As their knowledge grows in how to use this weapon, revisions may need to be made to test procedures. This is a normal situation.

GAO conclusion: More developmental testing may be able to answer at least some of the questions.

DOD position: Enough developmental testing has been done on the Bigeye system to allow it to enter operational testing. Continued efforts to go for the outer edges of performance envelopes are neither fiscally nor programmatically sound. The Packard Commission has reported at length on the downsides of continued testing to get to a perfect system.

GAO conclusion: Other problems are intractable. For example, the proposed tactic which exposes the aircraft to enemy defenses versus the need to control the temperature of the bomb.

DOD position: Employing the Bigeye bomb in combat is no more hazardous and demanding than employing other conventional weapons because common tactics are used for both. In fact, the standoff delivery of Bigeye enhances pilot survivability.

GAO conclusion: The potential of other technologies and other chemical weapons for accomplishing (deterrent and retaliatory) missions should be examined.

DOD position: DOD has a program to develop improved chemical munitions. We expect there will eventually be a followon to Bigeye. In the mean time, over the next 10 years, the Bigeye will provide a much-needed chemical deterrent and retaliatory capability where we currently have none.

Dr. **Welch**. In general, the General Accounting Office has continued to express concerns over the Bigeye bomb. The differences between the DOD and GAO audit team approaches I think are important to mention.

For us, the single criterion that must be satisfied is whether or not this bomb or any other system will significantly improve our combat effectiveness. When you take a look at the fact that we have no deep strike capability and take a look at the performance of the Bigeye bomb, to date, it appears to satisfy that criterion.

The General Accounting Office audit team, on the other hand, is more concerned, it appears, in taking a look at the performance specifications for the bomb, especially those around the fringes of the operational envelope. It is in this 5 and 10 percent range of temperature extremes, accuracy extremes, and so on, that they seem to be concentrating their attention.

We are not concerned with that because the Congress has told us repeatedly and the Secretary has said repeatedly that he will not push for that extraordinarily expensive last 5 percent of performance envelopes, and we will not permit the services to do this either.

This, again, was pointed out, I thought eloquently, by the Packard Commission, which urged that we not try to make a perfect weapon system, pointing out that there was no such thing as a perfect weapon system. Find something that will do the job, and the Bigeye I think is a good example of a system that is doing the job.

We will finish up the operational testing this fall. We will pick up on the things that need picking up on. But, as far as I am concerned, I agree with the services that this is ready for low rate initial production.

Senator **Warner**. Dr. Welch, on this next question you may wish to introduce to the subcommittee Deputy Under Secretary of the Army, Amoretta M. Hoeber, who has testified many times before this committee of the Congress on this subject.

The question is this. The committee has received the administration's report on the accelerated destruction plans for the current stockpile of unitary munitions and we would like to take this opportunity to commend the Army for the very professional way in which they have carried out the congressional direction. There are two questions.

Is the proposed demilitarization program the most cost and programmatically effective plan, or is the 1994 deadline resulting in some inefficiency?

Dr. **Welch**. Yes.

Mr. Chairman, I am very pleased to introduce Ms. Hoeber, who is here, this morning, for a response to your question.

Ms. **Hoeber**. Good morning, Mr. Chairman.

Senator **Warner**. Madam Secretary, we welcome you.

Ms. **Hoeber**. Let me respond to the question in a couple of ways.

The 1994 date was not a date that we would have selected. The Army had a plan for demilitarization. We were starting to demilitarize with the M-55 rockets, which are our most serious leakage problem, and we would have converted the plants built for that purpose for other demilitarization at a later date, as it became appropriate.

However, with the 1994 date passed by Congress, we were faced with developing a plan to accommodate that. We believe that there may, in fact, be a more optimum schedule than 1994. The 1994 date requires us to simultaneously build all the facilities that we would use for the demilitarization, and our preference would be to operate the Johnson Island facility prior to finalization of any other facilities to gain operational experience and to gather technical data.

We also would like a little more time to investigate the cryofracture process and see if, in fact, it would provide a cheaper alternative to the process now being built on Johnson Island.

Nevertheless, we can make the 1994 date if the congressional support for the financing is there, and if the EPA process and the environmental impact statement process proceed on schedule. So we are bound by the law at this stage.

Senator **Warner**. What would be the additional funding requirement above the fiscal year 1987 request if this plan were to be implemented?

Ms. **Hoeber**. It is hard to tell at this point because the exact number of facilities to be built will not be finally determined until January of 1987.

Our best estimate at this point is that we will require an additional $454 million for fiscal year 1987 over our current proposal, and a total of $306 million for fiscal year 1988.

Senator **Warner**. I thank you, Madam Secretary.

I have one additional question that I wish to ask General Merritt.

General, can you address any transitional indications of the Soviet Union's approach to CW? In other words, has there been any diminution in the intensity of their training in this area, any indication that they place less reliance on their capability in this area in the 12-month period, or in the past year of Congress' action.

General **Merritt**. Mr. Chairman, could I defer on that.

Senator **Warner**. I understand that most of that would be addressed in executive session. But again, it is very helpful because we have to deal with this in open session on the floor.

I think you could safely say there has been no diminution in their training or intensity or reliability on this weapon system.

General **Merritt**. Senator, I think I can say accurately that over the past year or few years neither has there been any diminution in training nor has there been any diminution in their stockpile, in the fundamental facts of their capability.

Senator **Warner**. In view of the action of the Congress last year, has there been any change in the other direction, acceleration of training?

General **Merritt**. I would have to defer on that. Not to my knowledge, Senator, but I could not tell you with precision. I would have to consult the intelligence people. I have not been informed on that.

[The information referred to follows:]

Concerning Soviet Chemical Warfare (CW) Training, over the past 12 months there has been no noted increase or decrease in emphasis/activity. The Soviets continue to put much reliance in their ability to be prepared to operate in a CW environment. Since 1970, the Soviets have continually expanded their capability to store CW weapons.

Senator **Warner**. Basically, then, the Soviet approach to this element of warfare has remained unchanged in the last 12 months?

General **Merritt**. I believe, almost certainly, it has been as a part of their capability.

Senator **Warner**. I mention that because certainly last year a considerable impetus was given to congressional action by a very distinguished panel of retired senior officers. As you recall, they came and prepared that report.

Thank you, gentlemen.

I see that my colleague has joined us. We are about to go into executive session, unless you have questions for the witnesses in open session.

Senator **Quayle**. Why don't you just go ahead and go into executive session. I will wait until then.

Senator **Warner**. I thank the Senator.

We will now take a 3-minute break.

I would ask that the room be secured for purposes of executive session.

EXECUTIVE SESSION

Senator **Warner**. The committee will resume the hearing in executive session. The Chair wishes to be advised that the room has been properly cleared.

Mr. **Graham**. We believe everybody is cleared.

Senator **Warner**. I an informed by counsel for the committee that the room has been adequately cleared, and we are now prepared to go into executive session.

Ambassador Abshire, would you lead off?

Ambassador **Abshire**. Mr. Chairman, I have no further comments other than questions you might have. I think I have clarified the delicacy of the problem with European allies, that they would have preferred that we proceed on our own rather than, as some of them would say, dragging them into this equation.

[Deleted.]

And it is unfortunate that it is classified.

Senator **Warner**. Can you detail with any more specificity about the various allies, just how they stand on it, the ones that are likely still to be in opposition?

Ambassador **Abshire**. Yes, I can, [deleted].

[Deleted.]

Senator **Warner**. Excuse me, Mr. Ambassador. There is notification from the floor of a vote, so we will modify our procedure here for a moment to allow my colleague Mr. Quayle to ask some questions, and then he must depart.

Mr. Quayle.

Senator **Quayle**. Thank you, Mr. Chairman.

If you would desire to go vote and come back, I could probably stay for about 10 minutes.

I would like to turn to the chemical potential through the short range theater ballistic missile. I am speaking specifically of [deleted]. I guess, specifically, I would like to—maybe, Ambassador Abshire, you could give me a feel for this, if this is a new threat that we ought to be looking at, and then I would like to get some specific comments on the aspects of some sort of an ATBM possibility.

But first, I guess, I would like to get your feeling on the potential threat of these short range theater ballistic missiles' conventional and chemical capability.

Ambassador **Abshire**. Senator, your question is a very timely one because [deleted]. The threat has been of really extreme concern to FRG Defense Minister Wörner. He has written about it, you might have seen that, in the Strategic Review. [Deleted.] It also affects the work of the CNAD, the Conference of National Armaments Directors.

[Deleted.] There are a lot of anomalies with the French participation because they are out of the military command, but they from the very beginning wanted to stay in air defense and are so involved. [Deleted.]

So we are moving forward in a very systematic and organized way at NATO to address a threat which Minister Wörner—and I happen to agree with him. I guess that is why I quote him—that could give a preemptive conventional capability in the 1990's with the increased conventional accuracy of those weapons.

[Deleted.]

Minister Wörner talks about preemptive action. Now, our concern on——

Senator **Quayle**. Preemptive action on our part?

Ambassador **Abshire**. Their part.

Senator **Quayle**. Their part.

Ambassador **Abshire**. Their part, conventional preemptive action with their TBM capabilities. I am not talking about today, as you understand, I am talking about the 1990's. Our concern, General Merritt and I are doing some very special work on, is that already we have this reduced warning which ranges from [deleted], and when you throw into that ambiguous warning, the Soviets—and I quote General Rogers again saying that they are going to end up with more flexible response or capability than we—that already they are going to have a conventional option before we ever get Europe reinforced. That greatly concerns us.

So you are right on target when you add to this this selective use of CW, that is added to in our concern, and when you add all of that military conventional capability and an attempt to preempt any ability at escalation that we have got, they are going to have a new capability of a political strategy of blackmail that I personally think is greater than anything they have got today because when you add the northern fleet capability of dominating the Norwegian Sea, a fleet in being, in effect, they are going to have something that will be more coercive if we don't take measures against this while there is time.

So this simply adds to the point that you have made.

Senator **QUAYLE**. I just might add for the record, I completely agree with that, and I am glad to see there is some movement in recognition of this growing threat. I read Mr. Wörner's article myself. As a matter of fact, many of the themes that he articulated in that article had come out in an earlier hearing that we had had here in the Senate Armed Services Committee, talking about the threat. We are going to get hopefully a followup hearing to focus on what exactly we are doing about about it.

Dr. Welch, what role does an antitactical ballistic missile system play in defending NATO in this type of attack that is going to be there when they modernize that in the late 1980's or early 1990's? Getting rid of the Scaleboard and the Frog and the Scud, they are going to have some pretty effective conventional and chemical capabilities.

Dr. Welch, can you comment on the ATBM capability?

Dr. **WELCH**. Yes, Senator. Thank you.

I very much agree with what you have just said and what the Ambassador has said. Defense Minister Wörner put it very eloquently I think in his article.

There is a problem. The Soviets are clearly headed toward a capability that will enable them to destroy or neutralize deep NATO targets using nonnuclear means, and they will be conventional, as well as chemical. Chemical has the advantage, of course, of being an area weapon system that can cover large areas such as port and depots where the conventional would not do as jood a job. So we are concerned about it.

To your specific question about ATBMs, I would respond this way. If we can deny the Soviets their military goal of putting chemical agents on one of our targets, just deny it, we will have deterred or certainly contributed toward chemical deterrence. And ATBMs offer, even a simple off-the-shelf ATBM, if you will, a technology of simple kinetic intercepts, which is near term and makes eminent sense in my view. We can deny the Soviets their desire to put chemical agents on our high value targets, reinforcement centers and so on, in my judgment, by the time of the mid-1995's, late 1990's roll around, and I think we should, as a country, move toward this kind of ATBM defense.

General **MERRITT**. May I add something to that, Senator?

Senator **QUAYLE**. Yes.

General **MERRITT**. In addition to what the Ambassador said about what is being done by the North Atlantic Council, the Military Committee likewise has been seized with this same issue. There is a study group called AGARD which responds to the Military Committee, and they have completed one ATBM study, and we just last week, as it turns out, had a follow-on study as we grow to understand more about this technologically and operationally, a follow-on study and as a representative of the United States, I have insisted that we have to see some results from that study next spring because of the fast moving pace. You know, the Patriot is going into the theater, and Patriot has some intrinsic capability, and the allies are beginning to look at that and are really coming together on the issue.

So it is going to be one of the most important things we look at in the alliance over the next couple of years.

Senator **Quayle**. Let me say that I have to vote. I would hope that we work collectively not only with our allies, but institute some possibilities of our own in the near term. We are looking at this for the next 2 years, and I think there are some things we can do in the near term. Obviously ATBM and some things that we may learn from SDI in the future would have direct application for what we can do in Europe. We are not cluttered with the ABM Treaty restraints in Europe either. So I think that we really have to accelerate this and push it.

Having said that, I am going to have to vote.

Thank you all very much.

[A brief recess was taken.]

Senator **Warner**. I offer you my apologies. I am comanager of a bill that is on the floor, and I had to remain to explain the vote to some of my colleagues and then get the next amendment started.

Senator Quayle had conducted the hearing in my absence, and I leave it to the witnesses to use your own initiative as to what additional discussion is needed for the record.

I have additional questions.

Mr. Ambassador, would you lead off?

Ambassador **Abshire**. Mr. Chairman, as you left for the floor you had asked me about which European countries might have some special concerns, and I had outlined the special concern on the part of the Federal Republic of Germany. They were concerned about not being singled out in a deployment plan, and we are working to take care of that concern.

Second, of course, they are concerned about the program on the reduction of the unitaries. Now, the two other countries that have expressed some concerns—and this is not surprising—are Denmark and Norway. Those countries do not have nuclear weapons deployed on their soil today. Norway came into the alliance with that understanding and also with the understanding that there wouldn't be foreign troops deployed on their soil in peacetime. It is too bad, we have those sort of a la carte arrangements in NATO, but we live with them.

So I think that the concern of those two countries we are going to be able to take care of that, of course, there would be, in addition to the deployment plan, and we cannot foresee in the deployment plan exactly how an attack would take place, exactly how CW, the binaries, would be deployed, but at the time of such plan, there would be further consultation with nations. We go through that anyway in our crisis management and through our alert system.

So, we hope to work out those sensitive problems. But because of the peculiarity of the Parliaments of those two countries and the coalitions, those have been very delicate things to work with.

That completes my answer.

Senator WARNER. Has the General been able to give his full testimony during executive session?

General MERRITT. I had not, Senator and I would just add a couple of points, if I may.

Senator WARNER. Yes, please.

General MERRITT. First, with respect to the points made by the Ambassador on the sensitivity of the nations, indeed we have dealt with those at the military level as we discussed, in the Military Committee. [Deleted.]

And again, we have had expressions of political concerns from both Denmark and Norway, and for all of the obvious reasons.

With respect to the Soviet doctrine issue which you raised in the open session, I think it is clear and safe to say that there hasn't been any substantial change in either doctrine or equipment, unless perhaps there has been an organization upgrade of the specifics which I can't give you off the cuff but would be happy to provide it. [Deleted.]

[The information follows:]

Concerning Soviet Chemical Warfare (CW) Training, over the past 12 months there has been no noted increase or decrease in emphasis/activity. The Soviets continue to put much reliance in their ability to be prepared to operate in a CW environment. Since 1970, the Soviets have continually expanded their capability to store CW weapons.

Senator WARNER. Thank you.

Mr. Emery.

Mr. EMERY. Mr. Chairman, I have just a couple of points that I might make.

UNITED STATES-SOVIET BILATERAL NEGOTIATIONS

I know that Senator Cohen and one or two other of your Senate colleagues have expressed an interest in the state of United States-Soviet bilateral negotiation, and with the understanding that we are here in a closed session, I can give you just a few points which might be useful and of interest.

We are in fact conducting bilateral discussions with the Soviet Union. These are being done in conjunction with the multilateral negotiations at CD in Geneva. They are not designed to replace the multilateral discussions [deleted.]

Senator WARNER. Could you characterize the bilateral talks as being a formalized discussion?

Mr. EMERY. No; it isn't casual. It is more involved than that.

Senator WARNER. The Ambassador—and I talked with him several weeks ago in Geneva—has a portfolio on this subject with specific instructions from the Secretary of State to conduct them.

Mr. EMERY. Well, he does not carry a separate portfolio, specifically for those discussions but he does have specific instructions, and the discussions are being conducted as specific discussions. But they are being done, I should say, more quietly than they would be otherwise.

Senator WARNER. Let us be more specific.

Are they being done in a covert fashion?

Mr. EMERY. I wouldn't say in a covert fashion. They are done quietly. There is no great secret to the fact that there are discussions, but it is not being advertised and it is not being broadcast. I think the word "covert" would be too strong.

Senator WARNER. Do the other members of the CD know of this?

Mr. EMERY. We believe other members of the CD are aware of it, but they are not aware of it officially. We have not told most of them. We have informed our allies in the Western group.

Senator WARNER. Has there been any press coverage of these?

Mr. EMERY. Not that I am aware of.

Senator WARNER. When were they initiated?

Mr. EMERY. [Deleted] we have been conducting bilateral discussions, and the intent of that is to lead to a general understanding and agreement between the United States and the Soviet Union to facilitate the conclusion of the multilateral process in the CD.

You might also like to know that we have had a couple of sessions this year. The next set is to occur in the timeframe between April 15 and 25 of this year, which of course is just around the corner.

Senator WARNER. That is very helpful.

Dr. Welch?

Dr. WELCH. Sir, I was asked to say a few things about the——

Senator WARNER. Would you characterize the progress at all in your judgment in the bilateral discussions.

Mr. EMERY. [Deleted.]

Senator WARNER. As you well know, in the area of nonproliferation there has been a very clear manifestation of interest by the Soviets for talks.

Would you say that these bilateral discussions are sort of moving apace with other discussions, for example, START talks, INF, or so forth? In other words, is there a pulse rate in the bilateral CW talks that is related to the pulse rate in those talks, or is there a distinct course and purpose as there is in the nonproliferation area?

Mr. EMERY. I would say there is more of a distinct course and purpose. I would say the pulse rates are not lined to NST, but I would say they are somewhat tied to general discussions and understandings that stem from the Summit [deleted]. We made it very clear that we did not want any nonproliferation discussions, wherever they may lead and how they may be conducted, to detract in any way, shape or form from what we considered to be the central and most important goal, which is, of course, negotiating a treaty. I think that is clear to the Soviets.

And judging from the increased interest, if I could phrase it that way, that the Soviets have shown in discussing the subjects of the chemical treaty, I think at this point in time we cannot draw the conclusion that they are specifically trying to derail one with attention to the other. We are very wary of that and don't want that to happen.

Senator WARNER. Fine, thank you.

Now, Dr. Welch.

Dr. **Welch**. Picking up on that, sir, we view proliferation as something which has to a certain extent happened. We count 16 nations today with chemical weapons, 6 more as probable. Among those for certain is Iraq, a country even as we talk, which is using these chemical weapons against Iran.

Senator **Warner**. Are those figures classified? You are giving them in executive session, of course.

Dr. **Welch**. The fact that there are 16 and 6 is unclassified.

Senator **Warner**. That information is unclassified?

Dr. **Welch**. Yes. The intelligence community is unwilling to say for certain that there are six nations possessing chemical weapons, but they probably do.

Senator **Warner**. That is unclassified?

Dr. **Welch**. Yes, sir.

Now, going back to classified information, although Iraq's use of chemical weapons has been certified by the United Nations investigating team [deleted].

Among those on the probable list is [deleted]. It is important to note that [deleted] has been given some conventional systems such as SCUD's from the Soviet Union which are also nuclear and chemical capable. I don't mean to infer that [deleted] possess anything other than the conventional warheads for those SCUD's.

Senator **Warner**. Conventional being chemical, though?

Dr. **Welch**. Conventional being high explosives.

Senator **Warner**. That isn't very clear.

Dr. **Welch**. Well, I do want to be clear on this. I believe they possess high explosive warheads for those missiles.

Senator **Warner**. You know they possess SCUD's.

Dr. **Welch**. Yes, certainly.

Senator **Warner**. They came about some time ago is my understanding.

Dr. **Welch**. Yes, it has been over some period of years.

Senator **Warner**. [Deleted] that they are HE.

Dr. **Welch**. That's correct.

Senator **Warner**. Not chemical and not nuclear?

Dr. **Welch**. That's correct.

It would be an easy thing, however, for [deleted] to produce or I think to acquire from others who have a chemical capability, warheads for SCUD's. I think we are going to see more and more of this in other nations as we go through the next decade.

Senator **Warner**. All right, they would use the basic launch system and incorporate some gerrymandered warhead, right?

Dr. **Welch**. It would probably be better than gerrymandered. The Soviet Union has had chemical warheads for SCUDs for some time and the engineering is quite well understood, the ballistics are well understood, and I think they may share that with [deleted].

But I want to point out that we anticipate more and more of a threat that has to be addressed along these non-Soviet, non-Warsaw Pact lines. Indeed, we did note that [deleted]. The SCUD, as you may recall, has a range of 180 miles. [Deleted] and something that for me is a threat.

Now, again, I want to go back and emphasize that we [deleted] they had high explosive warheads.

Senator Goldwater asked earlier about new Soviet chemical agents. There is no question the Soviets are going very strong and have a very robust R&D program to [deleted].

Senator **Warner**. At the present time they are in the R&D phase?

Dr. **Welch**. We believe they are in the R&D phase. We believe they have done some R&D on Afghan people using these agents.

Senator **Warner**. They weren't wearing protective suits, though.

Dr. **Welch**. That is correct.

Senator **Warner**. [Deleted.]

Dr. **Welch**. Exactly.

Senator **Warner**. Well, then, their introduction——

Dr. **Welch**. Well, we are not certain of that. Our best evidence——

Senator **Warner**. If they used them [deleted] somebody is making them.

Dr. **Welch**. [Deleted.]

Senator **Warner**. So what you are saying is there is a limited production in conjunction with the R&D program and a limited development.

Dr. **Welch**. Yes, sir.

Now, of course, there is a great deal of uncertainty in both ways on that. [Deleted.]

Senator **Warner**. Right.

Now, are we conducting an R&D program to devise the means by which to render [deleted] ineffective?

Dr. **Welch**. We have in R&D a program that has and is developing agents [deleted]. And they are out to [deleted].

Senator **Warner**. Is the [deleted] comparable to ours?

Dr. **Welch**. It is different, and [deleted].

Senator **Warner**. Well, I consider the mask a part of [deleted] in a generic sense.

Dr. **Welch**. We can, we believe, in time [deleted].

Senator **Warner**. What is the period of time? When you say system, you mean the [deleted].

Dr. **Welch**. Yes.

We believe that by [deleted]. It is important to note here that we must go ahead and build the binary munitions. We must not let anyone say that the binaries are not going to be an important part of deterrence; they certainly are. [Deleted.]

Senator **Warner**. Can you supply this committee with such testimony as the Department of Defense deems unclassified on this subject? I think Senator Goldwater has asked for it, but I want to be very precise, as to the R&D being performed in this country and the R&D being performed in the Soviet Union and elsewhere, for that matter, [deleted] that we have in our military structure.

Dr. **Welch**. Yes, sir. I would be very happy to do that.

Senator **Warner**. And you think there is a likelihood you can provide it?

Dr. **Welch**. There is a certainty that we can. I, of course——

Senator **Warner**. Is it out in the open now in defense journals or in other sources?

Dr. **Welch**. The fact that the Soviets are using new agents is generally an unclassified, well-known fact.

Senator **Warner**. Well, I know, but new agent is not specific enough for our purposes in the debate on the floor as to this large pie chart which Senator Glenn addressed and the substantial investment we are putting into protective gear. I mean, I think the Congress should know—subject to compromising intelligence sources or whatever other reasons classification has to be maintained—the Congress should know that this investment being made in fiscal year 1987, deliverable presumably in calendar year 1988, is in a period of 4 or 5 years going to be of questionable value.

Dr. **Welch**. Well, I don't want to say that. The 1987 request that we are asking for does include——

Senator **Warner**. $842 million, as I recollect.

Dr. **Welch**. That's right; but it does include now, in addition to the short-term protection against the known agents, those in the proliferation countries.

Senator **Warner**. But did you see my point? I think we have an obligation to inform our colleagues when we ask for the authorization and appropriation of these sums that their usefulness as part of our military structure has a time line.

Dr. **Welch**. It has a time line, and I certainly don't want the opponents of binary production or opponents of chemical defense modernization to use that as an excuse not to proceed, for example, with the binary production.

Senator **Warner**. Yes; but I can't sit here in judgment on what information should be given and not be given to my colleagues as they formulate their opinions. I have an obligation as the chairman of this committee to make available to Members of the Senate, irrespective of their viewpoints, all the known information that I think is pertinent to those issues.

Dr. **Welch**. I understand and appreciate that, and we will provide you everything we can in the unclassified form.

[The information follows:]

Soviet Development of Novel, Unknown Chemical Agents

The objective of the Soviet program to field new toxic weapons systems is to gain a significant military advantage. Some of the potential battlefield advantages of Soviet novel or unknown agents are to:

a. Defeat our protective equipment by bypassing or penetrating clothing or filtration systems.

b. Contaminate an area with an agent which is not detectable by fielded detectors and alarms.

c. Use an agent which cannot be treated by our medical capabilities.

d. Use an agent to which Soviet troops are immune by medical pretreatment.

e. Use an agent which could be confused with a naturally-occurring disease and is therefore difficult or impossible to identify as a toxic warfare agent.

The Soviets will therefore counter the improvements in our defense capabilities. This will restore the existing imbalance in their favor.

We know that the Soviets have supported the use of new agents in Southeast Asia and have used chemical warfare agents in Afghanistan. We also know they are doing extensive microbiological research on toxin-producing bacteria.

It is evident from publications in the open literature that the Soviets have studied numerous biotoxins. They have, for example, examined the human toxicity of the black wolf spider venom as well as toxins from the deadly nightshade mushroom. Moreover, they have studied tetrodotoxin from pufferfish and the toxic components of mottled scorpion venom. In the publication entitled, "Polypeptide Neurotoxins," a senior Soviet scientist declared that more than 25 neurotoxins had been isolated from cobra, scorpion, honey bee, and spider venoms. For ten of these toxins, the complete structure (amino acid sequences) had been ascertained. He went on to report the discovery of a novel toxin extracted from mottled scorpion venom. None of these potential Soviet agents can be detected by our our current detectors.

In response to this Soviet new agent program, the United States has realigned its research and development of defensive materiel. Our defensive program will lead to universal and adaptable masks, detectors, etc., capable of defending against new, unknown Soviet agents. Materiel already in the field, or soon to be introduced, is to be product improved to counter the new Soviet agents.

The United States will continue to conduct research on known and suspected Soviet agents to see if we can defend against them. We will use intelligence and other means to determine the nature of these agents. We will challenge our masks and other defensive materiel in test chambers with suspected Soviet agents to develop any new designs needed to ensure protection.

The United States will continue to keep its options open for its future retaliatory weapons. As we have for a number of years, we will continue research into new chemical agents and munitions. If the Soviets neutralize our deterrence by the introduction of new chemical agents, we must restore that deterrence. Accordingly, the United States will be prepared to develop, and if needed produce, munitions using chemical agents unknown to the Soviets.

Senator WARNER. All right.

Have you finished, Doctor,

Dr. WELCH. Yes, sir.

Senator WARNER. Thank you, everyone. I appreciate very much your testimony.

We will now proceed to the next panel.

The subcommittee will remain in executive session to review the U.S. Theater Nuclear Force programs. Our witness is Dr. Larry Woodruff, the Deputy Under Secretary of Defense for Strategic and Theater Nuclear Forces.

This is Dr. Woodruff's first appearance before this subcommittee, and I join others in welcoming him.

Thank you, Doctor.

STATEMENT OF DR. LAWRENCE WOODRUFF, DEPUTY UNDER SECRETARY OF DEFENSE FOR STRATEGIC AND THEATER NUCLEAR FORCES

Dr. WOODRUFF. Thank you very much. It is my pleasure to give you a very brief summary of the status.

Senator WARNER. I don't want to be out of here. I am much more interested in what you are doing, but I have to go to the floor.

Dr. WOODRUFF. At your staff's suggestion, I will cover three subjects.

Senator WARNER. What I would suggest is that we make a complete record on this point, and I will ask counsel for the committee to continue the hearing as I depart here in a few minutes.

If you could give me an overview summary, I would be most appreciative, and then staff will conduct the balance of the proceeding for the record.

Dr. WOODRUFF. Let me say that we are going to address three issues: the GLCM status, the Pershing II status, and then the safety, security and survivability mods that we are making in the current forces.

So in quick summary, let me go through each of those subjects.

Senator WARNER. Dr. Woodruff, as soon as you mentioned those three subjects to me, immediately I recognized the importance of your testimony. For a variety of reasons, many members of this subcommittee are not here right now. It is my judgment that we are going to ask you to return at a later date at which time we can have the benefit of your testimony. Hopefully, more members will be present because I know a number of my colleagues are quite interested in this subject. I am going to ask for you to extend the courtesy to the subcommittee to return at a later date of mutual convenience.

Dr. WOODRUFF. Yes, sir.

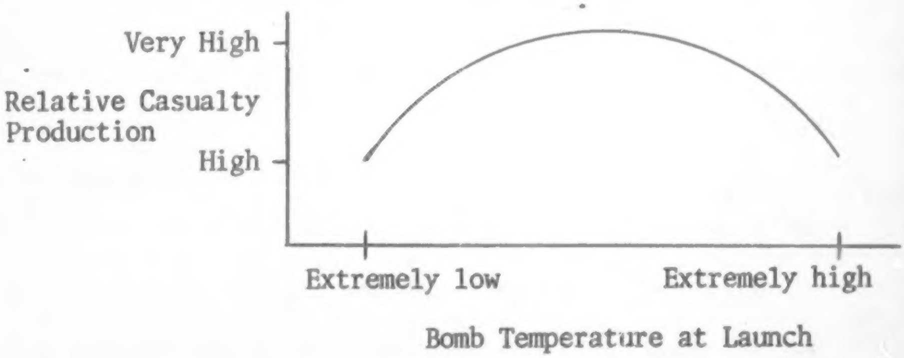
[Questions for the hearing record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOHN W. WARNER

BIGEYE BOMB

Senator WARNER. Dr. Welch, are the problems with agent toxicity at the extreme temperature ranges a result of our emphasis on safety in the development of the binary concept. Does this affect the military effectiveness of the Bigeye bomb?

Dr. WELCH. Our commitment to safety requires that we do not permit the two binary components to mix and form lethal agent until the bomb is launched toward its target. This safety commitment means that we cannot control bomb temperature as fully as possible if we permitted mixing before launch. But even if at launch the bomb is extremely cold or extremely hot, the lethal agent formed will cause casualties, cause the enemy to get into debilitating masks and overgarments, will restrict the terrain he may want to occupy and material he may want to use, and will delay his operations. At extreme temperatures, the bomb will cause casualties somewhat less than those occurring when the bomb is launched at moderate temperatures. So the first question that must be asked is this: What percent of the time will the bomb be launched at extreme temperatures? Operationally, we expect to see extreme temperatures about 5 percent of the time. The second question to be asked is, for this 5 percent of the time, what is the reduction in casualty production, and is it significant? The answer is illustrated here:



So even for the 5 percent of the time when extreme temperatures will be experienced, the loss in casualty production is relatively low.

In sum, at all temperatures, the bomb fully satisfies 3 of the 4 operational reasons for its use (enemy forced into debilitating protective gear, his key terrain and material restricted or denied because of contamination, his combat schedule or time-line upset because of terrain and material restrictions, debilitation, etc.). And even for the 5 percent of the time when extreme temperatures occur, the fourth reason for using the bomb, casualty production, is not significantly reduced from those achieved at moderate temperatures. Thus our emphasis on safety does not affect the military effectiveness of the Bigeye bomb.

MODERN BINARY MUNITIONS

Senator WARNER. Mr. Emery, what measure of support does the Unites States enjoy in the Conference on Disarmament, and what has been the general reaction in that body to the congressional action approving the production of modern binary munitions?

Mr. Emery. In general the nonaligned and Western members of the Conference on Disarmament [CD] share the U.S. interest in effective verification of a CW treaty and support the general approach contained in the U.S. draft treaty tabled in 1984.

In the CD there has actually been very little said about the U.S. binary program. The Soviet Union, however, was quite strident last year in their condemnation of the initial authorization of binaries. However, even this was muted in the first several months of this year. Recently the U.S.S.R. and Bulgaria made statements very critical of the alleged United States desire to deploy binaries in Europe.

Senator Warner. The subcommittee stands adjourned.

[Whereupon, at 11:45 a.m., the subcommittee recessed subject to the call of the Chair.]

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DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

THURSDAY, APRIL 24, 1986

U.S. SENATE,
SUBCOMMITTEE ON STRATEGIC AND
THEATER NUCLEAR FORCES,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

ANTITACTICAL BALLISTIC MISSILE [ATBM] SYSTEM

The subcommittee met in open session, pursuant to notice, at 9:05 a.m., in room SR-222, Russell Senate Office Building, Senator John W. Warner (chairman) presiding.

Members present: Senators Warner, Thurmond, Cohen, Quayle, Wilson, Exon, and Levin.

Staff present: Patrick A. Tucker, general counsel; Robert G. Bell, Robert F. Bott, Douglas R. Graham, William E. Hoehn, Jr., George K. Johnson, Jr., and Judith A. Freedman, professional staff members; Russell C. Miller, research assistant; Karen A. Love, staff assistant.

Also present: Romie L. Brownlee, assistant to Senator Warner; James M. Bodner, assistant to Senator Cohen; Henry D. Sokolski, assistant to Senator Quayle; Mark J. Albrecht, assistant to Senator Wilson; Janne E. Nolan, assistant to Senator Hart; Jeffrey B. Subko, assistant to Senator Exon; John B. Keeley, assistant to Senator Levin; and Thomas K. Longstreth, assistant to Senator Kennedy.

OPENING STATEMENT BY SENATOR JOHN W. WARNER, CHAIRMAN

Senator **WARNER**. The subcommittee convenes in open session this morning to address antitactical ballistic missile [ATBM] system development activities within the Department of Defense. The Chair will leave it to the discretion of our witnesses as to whether a closed session would be appropriate after this open session.

On January 30, 1986, the subcommittee conducted a hearing with public witnesses that focused on the requirement for a defense of high value NATO targets against Soviet short-range ballistic missiles armed with conventional, chemical, or nuclear warheads.

Our witnesses at that hearing, Mr. Jim Woolsey and Mr. Dennis Gormley, did an excellent job of describing Soviet capabilities in this area and of explaining how these capabilities fit into Soviet military strategy. They also identified the vulnerabilities of key NATO targets to this threat.

I have been encouraged by recent indications of growing support among our allies for the development of a defense against Soviet tactical ballistic missiles. In particular, I found West German Defense Minister Manfred Wörner's piece in the winter 1986 issue of "Strategic Review" a very thoughtful analysis of the problem.

I think it is very important that the United States support our allies in responding to this challenge. I would like to submit a copy of Minister Wörner's article in the record of this hearing following the opening statements of our witnesses.

Today the subcommittee will focus on the adequacy of existing efforts within the Department of Defense to develop the capabilities required to support our allies in addressing this threat. Our witnesses this morning are Dr. Fred Ikle, the Under Secretary of Defense for Policy; Lt. Gen. James A. Abrahamson, U.S. Air Force, the Director of the Strategic Defense Initiative Organization; and Lt. Gen. John F. Wall, U.S. Army, the Commanding General of the Army's Strategic Defense Command.

On behalf of the subcommittee, I would like to welcome all of you this morning.

I would also point out there is due a special commendation to our colleague, Senator Quayle for his interest in this subject and the leadership he has displayed.

Mr. Quayle, do you have any opening comments?

Senator QUAYLE. Mr. Chairman, I want to extend my deep appreciation for your effort and leadership in getting involved in this issue. I think it is one of the most important issues we have had to confront.

We had a number of discussions privately at one meeting, we have had a number of private meetings with our NATO allies and friends who are very concerned about this issue. I am very much interested in what we can be doing really more in the near term and specifically what kind of cooperation we can develop with our allies.

I am going to be offering an amendment to try to set aside some money for NATO cooperation, specifically on ATBM, to encourage our allies and the United States to work together on this.

Mr. Chairman, at my request, the Congressional Research Service just completed a very interesting study on ballistic missile proliferation in other countries besides the United States and the Soviet Union. It is a document I am going to be releasing today, and I would ask that the executive summary of that study be included at an appropriate place in the record.

Many of the countries acquiring ballistic missile technology are close to the world's hot spots. This again shows that this conventional ballistic missile defense initiative is very, very important.

Mr. Chairman, I think you are right on the target in holding this hearing. I applaud you for taking the lead in getting involved in this issue. It is something of deep concern to me. I ask unanimous consent to place my opening statement in the record.

Senator WARNER. Without objection.

[The prepared statement of Senator Quayle follows:]

PREPARED STATEMENT OF SENATOR DAN QUAYLE

Mr. Chairman, I want to thank you for granting my request to hold this hearing today on what our military is or should be doing to develop defenses against tactical ballistic missiles such as the Soviet SS-21's, SS-22's, and SS-23's.

Testimony this subcommittee received from outside witnesses on January 30 made it clear that by the early 1990's the Soviets could use these new, highly accurate missiles to launch an effective, nonnuclear knockout blow against NATO's key military assets. The subcommittee also received testimony from the American-Israeli Public Affairs Committee, which detailed the critical threat Syrian SS-21's and other ballistic missile systems are likely to pose to Israel's all important air bases.

In addition, at my request, the Congressional Research Service [CRS] has just completed a study on ballistic missile proliferation, which I am releasing today. The CRS study makes it clear that by the early 1990's our allies in Southwest Asia, the Middle East, and the Far East may either have or be threatened by ballistic missiles of non-Soviet, non-American design.

I am anxious to learn precisely what our military can do with our allies to address the tactical ballistic missile threat. Frankly, from what I have been able to learn in private briefings, the United States has not adequately focused on the urgency of developing near-term defenses against it.

I am confident that we can do better. During markup of the 1987 fiscal year defense authorization bill, I intend to offer an amendment to identify funding for the cooperative development of defense against tactical ballistic missiles for deployment as soon as possible. This fund would make it possible to match allied funding for antitactical ballistic missile work now underway or soon to begin.

I believe that this is the minimum we can do to assure our security and that of our allies.

Senator WARNER. Senator Thurmond.

Senator THURMOND. I have a brief statement. To save time, I will place it in the record.

[The prepared statement of Senator Strom Thurmond follows:]

PREPARED STATEMENT OF SENATOR STROM THURMOND

Mr. Chairman: It is a pleasure to join you here today to receive testimony on antitactical ballistic missile development. Dr. Ikle, General Abrahamson, and General Wall, welcome to today's proceedings.

Mr. Chairman, I want to commend you for the work you have done again this year as the Chairman of this subcommittee in preparing an outstanding record in support of the President's programs. I would like to also note that General Abrahamson has become somewhat of a television star by virtue of his appearance on the recent public television special on the Strategic Defense Initiative.

Mr. Chairman, General Abrahamson did an excellent job answering questions about SDI on the program, and I hope that the show continues to be seen around the country. General Abrahamson, you might give acting a thought as a second career if and when you decide to retire. I might add that acting was certainly not a bad start for the President. Thank you, Mr. Chairman.

Senator WARNER. I think you join me in expressing our appreciation to Mr. Quayle for taking a leadership role in this issue.

Senator THURMOND. Mighty fine. He always does a good job when he undertakes it.

Senator WARNER. Dr. Ikle, we will submit your statement for the record.

STATEMENT OF HON. FRED C. IKLE, UNDER SECRETARY OF DEFENSE FOR POLICY

Mr. IKLE. Thank you, Mr. Chairman.

I will make a few brief opening remarks and Lieutenant General Abrahamson and Lieutenant General Wall will discuss work under way in the strategic defense program and U.S. Army, respectively, as it might bear on the shorter range missile threat.

I congratulate you and Senator Quayle in pursuing this question with Senator Thurmond on the ATBM potential.

In the first hearing, Mr. Chairman, you correctly stated that ATBM systems could be developed and employed in a manner fully consistent with the ABM Treaty and you said, therefore, in your excellent hearing in January it might be a promising option for early deployment in Europe.

We must start addressing the ATBM question by recognizing that in the 1990's the Soviet tactical ballistic missiles could be accurate enough to pose a serious military threat to our allies even if conventionally armed.

It is especially important for a surprise attack that might be launched at the outset of a conventional war. We do anticipate that the Soviet Union will have a new generation of shorter range missiles capable of effectively delivering conventional payloads deep into Western Europe.

The deployment of modernized SS-21, SS-12, SS-22, and SS-23 missiles to replace or upgrade older missiles portends an area in which the Soviet Union could have a strike capability that could destroy significant parts of NATO conventional military assets.

With the Soviets fielding these more accurate systems, they could launch a devastating attack on NATO military installations such as airfields, command and control nodes, air defense installations, targets that heretofore could be surprise attacked only by crossing the nuclear threshold or would have to be attacked by air power against which NATO possesses now a defensive system.

In light of these implications, NATO's political and technical bodies are now assessing the defensive requirements against such missile attacks, considering, of course, active as well as passive defense measures that may be needed to deal with this threat.

You referred, Mr. Chairman, to the article by Defense Minister Manfred Wörner that shows a great deal of insight on this question. Minister Wörner recommends, as you stated, that for improving NATO air defense, the shorter range conventional armed missile threat must be seen as part of the overall threat.

Let us keep in mind that the alliance will, after all, make substantial investments in defending against attack by Warsaw Pact aircraft, so it makes good military sense to protect the same high value NATO military targets from strikes by conventionally armed tactical missiles.

NATO, unlike the United States, has continued over the years to make significant investments in air defense. As you know, Mr. Chairman, the Federal Republic, for example, concluded an important agreement with the United States in updating air defenses in a joint effort to improve air defense in NATO's central region.

As the Soviet air capability increases, thus the alliance has responded by improving the existing air defense network, deploying Rapier, Hawk, and Patriot systems. Now, facing the threat of tactical missiles, we have to design active and passive measures against those.

The antitactical missile capability could improve the NATO military situation, our other allies, and our own security situation in the next decade in several ways.

It would remove from the Soviet military planner the predictability of precision strikes with their tactical missiles, thus making surprise attack less reliable, less attractive, hence helping defense.

It would also help our side in making it possible for us to respond to tactical warning, to warnings of aggression that might still be somewhat ambiguous, in a way that are less escalating, less dangerous that we would have to use if we had no active defenses.

In this sense, development of a tactical missle defense system is also stabilizing.

The arms control aspects of tactical defenses, Mr. Chairman, as you pointed out in your first hearing in this series of hearings, are more akin to those of air defenses than of strategic missile defenses because the ABM Treaty covers defenses against strategic ballistic missiles. It does not restrict defense against tactical shorter range ballistic missiles.

The development, testing and deployment of defensive systems against these tactical missile threats are permitted by the treaty so long as these systems do not include interceptor missiles, launchers, or radars that are given the capability to counter strategic missiles or their elements in flight trajectory.

We feel NATO is off to a good start in determining the options that should be pursued as an integral part of a program to deal with the Soviet shorter range conventional missile threat. The United States will continue to give its full support to this NATO-wide effort.

At the same time, the Defense Department wants to ensure that NATO has the benefit of the bonus effect for conventional defense that is likely to be generated as a result of our SDI work, a subject that General Abrahamson is going to address.

So, we should provide the allies with an opportunity to become involved in SDI research that addresses some of the unique aspects of defending NATO Europe against missile attack.

But the ATBM, let me point out in concluding, is also important for other allies and friends of the United States—for example, our allies in the Pacific and for Israel—in the next two decades.

Moreover, our own U.S. Forces overseas, either deployed in peacetime or engaged in a military operation in Southwest Asia, in the Pacific, could in future circumstances be very much dependent on antitactical ballistic missile defenses for their survival and their security.

Of course, as you know, our Navy is already pursuing the various aspects of antitactical ballistic missile defenses as they relate to their particular security concerns.

Mr. Chairman, this concludes my opening remarks. I will be pleased to answer your questions.

I think General Abrahamson and General Wall have some remarks.

[The prepared statement of Mr. Ikle follows:]

PREPARED STATEMENT OF DR. FRED C. IKLE, UNDER SECRETARY OF DEFENSE FOR POLICY, ON THE STRATEGIC DEFENSE INITIATIVE AND TACTICAL MISSILE DEFENSE

Mr. Chairman, I wish to thank you for inviting me to appear before this subcommittee to discuss our policy on defense against tactical ballistic missiles. Several of our allies, especially in Europe, are considering the need for antitactical ballistic missile defenses.

Lieutenant General Abrahamson and Lieutenant General Wall will discuss work underway in the Strategic Defense Initiative [SDI] Program, and in the U.S. Army, respectively, as it might bear on the shorter-range missile threat.

Our starting point to address on this issue is the recognition that in the 1990's, Soviet tactical ballistic missiles could be accurate enough to pose a serious military threat to our allies, especially for a surprise attack at the outset of a conventional war. We anticipate the Soviet Union will have a new generation of shorter-range missiles capable of effectively delivering conventional payloads, deep into Western European territory. The deployment of modernized SS-21, SS-12/22, and SS-23 missiles to replace or upgrade older Frog, Scaleboard, and Scud missiles portends an era in which the Soviet Union could have a conventional strike capability that could destroy a significant part of NATO's military capability. That is to say, if the Soviets fielded these more accurate systems, they could launch devastating attacks on major NATO military installations, such as airfields, command and control nodes, air defense installations, etc., targets that heretofore could be attacked in a surprise strike only by crossing the nuclear threshold.

Aware of these implications, NATO's political, military and technical bodies are now assessing the defense requirements against such missile attacks. Active as well as passive defense measures are needed to deal with this threat.

Defense Minister Manfred Wörner of the Federal Republic of Germany has brought a great deal of insight to this question in his recent piece in Strategic Review entitled "A Missile Defense for NATO Europe." I recommend this very thoughtful analysis to all subcommittee members. Minister Wörner recommends that for improving NATO's air defense, the shorter-range, conventionally armed missile threat must be seen as part of the overall threat. The Alliance will, after all, continue to make substantial investments in defending against attacks by Warsaw Pact aircraft. It makes good military sense to protect the same high-value NATO targets from strikes by conventionally armed tactical missiles. I agree with Dr. Wörner's judgment that active defenses against the tactical missiles confronting NATO are needed.

Mr. Chairman, I wish to draw your attention to the fact that NATO, unlike the United States, has continued over the years to make significant investments in air defense. As the Soviet air capabilities increased quantitatively and qualitatively, the Alliance responded by improving its air defense network, deploying the Rapier, Hawk, and Patriot systems. Now faced with the future capabilities of Soviet tactical missiles, NATO is examining new active and passive defensive measures—including an antimissile defense—that may be needed to meet this threat.

Let us be clear that NATO's deterrent forces would have to be protected from a surprise attack by conventionally armed, tactical missiles regardless of the future of SDI. We anticipate, however, that NATO will want to draw upon the basic technologies made available by SDI research, to strengthen NATO's tactical missile defense, thus avoiding wasteful duplications of effort. We anticipate similarly that many results of SDI research could provide bonus effects for improving NATO's conventional forces in general.

In my view, an antitactical ballistic missile capability could significantly improve NATO's military situation in the next decade. It would remove the predictability of precision strikes with tactical ballistic missiles, which make them such an attractive option for the Soviet planner to seek a headstart in a conventional attack. Thus, the Soviet planners could not be confident of a successful preemption. Furthermore, NATO missile defenses would help deterrent stability by making it less urgent for the Alliance to take risky steps in anticipation of a Soviet attack.

The arms control aspects of tactical missile defenses are more akin to those of air defenses than of strategic missile defenses. The ABM Treaty covers defenses against strategic ballistic missiles; it does restrict defense against tactical, shorter-range ballistic missiles (such as the Soviet SS-21's, SS-12/22's, and SS-23's). Consequently, the development, testing, and deployment of defensive systems against these tactical ballistic missile threats are permitted by the treaty, so long as these systems do not include interceptor missiles, launchers, or radars that are given capabilities to counter strategic ballistic missiles or their elements in flight trajectory.

NATO is off to a good start in determining the options that should be pursued as an integral part of its air defense improvement program to deal with the Soviet shorter range conventional missile threat. The United States will continue to give its full support to this NATO-wide effort. At the same time, the Defense Department wants to ensure that NATO has the benefit of the bonus effects for conventional defense that are likely to be generated as a result of our SDI work. Hence, we want to provide the allies with the opportunity to become involved in SDI research projects that address some of the unique aspects of defending NATO-Europe against missile attack. Furthermore, our research effort on missile and air defenses must address near-term responses to the Soviet shorter range missile threat, such as upgrading defensive systems already deployed in NATO.

This concludes my formal statement, Mr. Chairman, I would be pleased to address any questions the subcommittee might want to pursue.

Senator **Warner**. We will allow you two to make your direct presentations before questions. General Abrahamson, you may proceed.

STATEMENT OF LT. GEN. JAMES A. ABRAHAMSON, U.S. AIR FORCE, DIRECTOR, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

General **Abrahamson**. I am delighted to be back again and, obviously, to follow up on discussions that did start in our earlier hearings on the overall SDI program.

I will offer this statement for the record, but not read from the statement.

Senator **Warner**. Without objection, we will accept it.

General **Abrahamson**. Thank you.

I should like to point out several things. Starting with the objective of the SDI program, as we have often stated in formal testimony and certainly in our directive documents, it is to examine the fundamental technologies so that we can ensure that the United States and our allies have the option for a future decision on defense against ballistic missiles of all ranges.

Therefore, we consider the short-range ballistic missiles to be a very important part of the overall task of our technology investigations and our research program. However, it is important also to recognize that there are some ongoing programs within the Department of Defense, some of which General Wall will discuss, which are operational programs today and are quite separate from the SDI research.

Of course, in this sense we think that within the Department of Defense it is a very fundamental and very important thing that we look at the overall problem with all of our assets and addressing all of the aspects of an overall program because it is a difficult problem.

As we have examined architectures for the strategic defense initiative, we have seen that many of the basic technologies can indeed contribute in very important ways against a short-range ballistic missile threat.

In examining their potential participation in the overall SDI program we have discussed with our various allies, areas in which we can look at fundamental technology, operating well within both the intent and legal limits of the ABM Treaty, which can indeed contribute to the solution for both the long-range and short-range ballistic missile threat.

We are encouraged by their interest in both aspects of that program. Many of our allies have discussed a very significant interest in examining the tradeoffs and the architectural applications of a very full and effective defense against the short-range threat that we are talking about.

So, those have been part of these discussions. I think perhaps I would like to use one chart to illustrate the structure of the SDI program and how that can contribute to ballistic missile defense against the shorter range threat and dealing with the question, of course, of treaty compliance.

SDI FY86/87 PROGRAM EMPHASIS

- GROUND BASED LASER ACCELERATION
- CONTINUED KEW (SBKKV, ERIS, HEDI)
- SENSOR TECHNOLOGY & DATA BASE COLLECTION EXPERIMENTS (NOT PROTOTYPES)
- ARCHITECTURAL DEFINITIONS OF SYSTEMS
- BM/C^3, ITS IMPACT ON ARCHITECTURES & NATIONAL TEST BED
- SURVIVABILITY & LETHALITY EXPERIMENTS
- INTERACTIVE DISCRIMINATION

I am picking up, of course, now where Dr. Ikle pointed out and left off, that the ABM Treaty deals with the integrated experiments and with the overall components and capabilities against full long-range ICBM threats.

Underneath those kinds of integrated experiments that we are conducting in SDI, and examples of systems that would deal with that would be the HEDI system. That is a more traditional missile to intercept at very high altitude in the atmosphere for the last layer of a layered defense, an incoming ICBM.

But underneath that kind of program is a very fundamental technology base program looking at such things as lightweight rocket motors, new ultra lightweight systems for guidance and control, seekers that will be radiation hardened that can exist in even a nuclear battlefield environment, new structures and new composite materials, new communications and computer systems that will allow us to have this instantaneous kind of communications across a very broad theater front as well as across a global front for an overall global SDI system.

Obviously, signal processing that can operate in these very short periods of time and operate reliably because it would be fault tolerant. These are fundamental areas of research. On the one hand it is a basic technology effort. In some cases it can be applied against the ICBM. In other cases it can be applied against the short-range ballistic missile threat.

Because they are fundamental technology examinations, we feel there is clearly no problem in terms of the ABM Treaty compliance issue or the treaty issue. Therefore, we do believe that many areas of SDI research can contribute to this short-range threat problem.

Now, in addition to that, I think, as General Wall proceeds, he can lay out some of the ongoing programs and how they can amplify and augment some of efforts that we are carrying out.

Senator Warner. Thank you, General.

[The prepared statement of General Abrahamson follows:]

PREPARED STATEMENT BY LT. GEN. JAMES A. ABRAHAMSON, DIRECTOR, STRATEGIC DEFENSE INITIATIVE ORGANIZATION

Thank you, Mr. Chairman, for the opportunity to appear before your subcommittee and discuss the Strategic Defense Initiative [SDI] Program and the tactical missile threat confronting our allies. I appreciate your interest in this matter and look forward to addressing your questions. I would like to briefly review our program objectives and discuss a few of the salient points concerning the defense of our allies and the part the SDI could be expected to play.

The strategic defense initiative is a program or rigorous research focused on the President's intention to determine if it is possible to render ballistic missiles obsolete, and therefore no longer a sound investment. The SDI Research Program offers the promise of a better basis for deterring aggression, strengthening stability, and increasing the security of the United States and our allies.

Thus, the promise of enhanced deterrence is an important factor underlying the SDI. There are other significant ways in which a defense against ballistic missiles will help to ensure against nuclear conflict. In the arms control arena, the SDI complements and supports U.S. efforts to seek equitable, verifiable reductions in offensive nuclear forces. Defenses could also provide protection against an accidental missile launch or launches by some future irrational leader in possession of a nuclear armed missile. Additionally, the SDI Program is a prudent hedge in the face of very aggressive Soviet research and development activities in strategic defense.

The security interests of the United States and our allies are threatened worldwide by Soviet ballistic missiles. Their threat is heavily focused on the United States. The defense of the allies has been a part of SDI's global architecture studies. The SDI allied defense efforts have concentrated on theater defense across the full geographic spectrum. In these studies it has become clear that the theater environment has unique requirements which must be addressed by specific theater defense architectures.

Deterrence requires that no doubt be left in the mind of the potential aggressor that the risks and costs of aggression far outweigh any gains that might be sought. We, together with our allies, have consistently pursued this course. In recent years, however, the concept of deterrence at the strategic level has focused almost completely on one approach, that is, posing to an aggressor unacceptable costs through the ultimate threat of nuclear retaliation. This almost exclusive reliance on the threat of retaliation with offensive forces—without the ability to deny an aggressor his objectives through defensive forces—has not always been the case.

As we look toward the future, the continuing growth and sophistication of Soviet offensive forces, as well as their defensive capabilities, would, if left unchecked and unanswered, rapidly place our deterrent capacity—as represented by United States and allied forces—in question, by reducing or limiting the options so important to the viability of our deterrent strategy. The SDI offers the opportunity to shift the deterrent stance from a foundation based primarily on the ultimate threat of devastating nuclear retaliation to one in which nonnuclear defenses play a greater and greater role.

As Secretary Weinberger has pointed out, "Ultimately, we all must realize that in a nuclear world we share a common destiny and are united in our vulnerability to nuclear attack. That is why we must work together to bring our best minds to the formidable task of unlocking scientific knowledge that can unite us all in a world where no nation need fear the sudden advent of nuclear war." This opportunity is manifested in a number of ways for both ourselves and our allies.

Such an approach would provide a far sounder basis for a stable and reliable strategic relationship. An aggressor's uncertainties regarding his offensive weapons' effectiveness would be markedly increased. This reduced confidence—because the United States and its allies would be more capable of denying and aggressor's military objectives—would make the aggressor much less likely to contemplate initiating a nuclear conflict, even in crisis situations. At the same time, this would mean a reduction in the utility, or perceived value, of ballistic missiles, which is a giant step toward rendering them impotent and obsolete. On balance, the likelihood of nuclear conflict would be vastly reduced, and that is the essence of effective strategic deterrence.

The foregoing, as well as most current discourse, does center on nuclear deterrence. There is, however, another facet of deterrence that may hold for our allies equal or even greater relevance. Too often, in the debate surrounding the SDI, the question of conventional deterrence is not in the forefront.

Of allied forces in Europe, for example, 95 percent of the divisions, 85 percent of the tanks, and 80 percent of the combat aircraft are provided, manned, and paid for by the European allies. Soviet doctrine seems to be evolving along lines that place ever greater value on tactical ballistic missiles and the havoc they could wreak on NATO forces. Soviet shorter-range missiles presently provide overlapping capabilities to strike all NATO Europe, as well as our Asian allies. Their doctrine stresses the use of conventionally armed and chemically armed ballistic missiles to initiate rapid and wide-ranging attacks on crucial military targets in order to cripple the ability to counter the initial thrust of a Soviet attack within, and to inhibit resupply and reinforcement from without.

In considering the development and deployment of ballistic missile defense for Europe it is important to recognize that the European operational environment is quite different from that of North America. Europe has a combined arms environment in which the ballistic missile is but one element. In addition to the nuclear threat the ballistic missiles targeted at Western Europe can be armed with conventional high explosives and chemical munitions which pose a serious threat to NATO forces. Unlike intercontinental missiles, tactical ballistic missiles have low altitude trajectories and provide short times of flight.

The lack of missile defense is an anomaly. NATO forces are capable of defending against tanks, aircraft, and infantry, but not against tactical ballistic missiles. NATO nuclear and air defense forces are vulnerable to Soviet TBM strike. In the absence of defense, ballistic missiles provide the Soviets with very high confidence of arrival on target and the possibility of a cheaper victory. Consequently, NATO must rely on the threatened use of strategic and theater nuclear forces to deter aggression. The remarkable point is not that ATBM is needed but that it had not been deployed years ago.

So far Soviet military planners have had a free ride on the use of ballistic missiles in any designs for aggression in a tactical application. Even a modest defense against tactical ballistic missiles would have a major effect on the situation. Not only would there be significantly increased costs for offensive forces to maintain the same level of advantage enjoyed today. But other technologies and the changing nature or operations and tactics would interact with defenses to create altogether more complex problems for the planner entertaining any thoughts of aggression.

As you are aware, in March 1985, Secretary Weinberger invited the allies to participate in the SDI Program. We believe there is considerable scientific and technical expertise amongst our allies in their scientific and industrial communities to make substantial contributions to the SDI Program. Since the Secretary's invitation, we have received much interest. Significantly we have signed memorandums of understanding with the United Kingdom and the Federal Republic of Germany. We expect more agreements to follow and continue to have general government-to-government discussions with a variety of other allies.

Dr. Ikle mentioned in his prepared remarks that NATO is now engaged in a number of studies to determine what measures should be undertaken to meet the Soviet tactical missile threat. In parallel with the alliance's study and as a complement to it, SDIO plans to sponsor allied architecture studies which will examine in detail the shorter-range missile threat confronting our allies. Our allies obviously can offer a unique perspective on the shorter-range threat and how best to defend against it.

The allies architecture studies will provide the SDIO with a better understanding of the requirements for a credible, robust defense—a defense which is developed in an evolutionary manner, and capitalizes the evaluations of those who confront directly the shorter-range threat.

By reducing or eliminating the military effectiveness of ballistic missiles, both tactical and strategic, defense systems thus have the very real potential for enhancing deterrence against not only strategic nuclear conflict, but also against nuclear, chemical, and conventional attacks on our allies as well.

The DOD has over the past several years conducted a program aimed at countering the tactical missile threat. Although limited by technology to coping with only the shortest range conventionally armed missiles, it nevertheless is providing a foundation for the development of a more broadly based effort to develop a credible defense for our allies consistent with the SDI goal and the President's vision. The Antitactical Missile Program provides the basis for the SDI in cooperation with our other allies to develop an evolutionary defensive capability. Allied contributions could reduce both the schedule and the cost of the research program.

Thank you very much for the opportunity to testify before your committee. I will be happy to respond to your questions.

Senator **Warner**. General Wall, may we hear from you now.

STATEMENT OF LT. GEN. JOHN F. WALL, U.S. ARMY, COMMANDING GENERAL, ARMY STRATEGIC DEFENSE COMMAND

General WALL. Mr. Chairman, I am pleased to appear today.

I have submitted a short statement for the record. I will not read from that.

Senator WARNER. Without objection.

General WALL. The Strategic Defense Command is a research organization and because the Army is doing a lot more than what my command is doing, I brought two assistants with me, Col. Raoul Alcala from ODCSOPS, and Brig. Gen. Jerry Harrison from the Army Research, Development, and Acquisition Office, Weapons Systems Division, who also might answer questions.

I certainly agree with the previous witnesses, my bosses, that the SDI cannot confine itself to ICBM's and SLBM's. We must examine the technologies against shorter-range TBM's and tactical missiles and the Army is supporting General Abrahamson in this area.

The Army has been preeminent in terminal missile defense, building on its significant role in the early space program and is continuing this significant role today. We execute about one-third of the SDI budget, for General Abrahamson in all phases of the defense.

The Army has been designated the lead in short-range ballistic missile defense architecture by General Abrahamson for SDI. We are responsible for the development of technologies for research in that area, optimizing existing theater systems is the first step and we believe also that allied participation is crucial to this arena.

There are no studies currently that, to my satisfaction integrate aircraft, cruise missiles, and tactical ballistic missile defenses into a unified network. The field commanders in Europe and other theaters have made some progress with innovative improvements in passive defense measures. However, tactical missile defense is a complex problem. Ballistic missiles, cruise missiles, all types of stand-off missiles, aircraft and the flexibility of the threat certainly make a defense very dicey.

We will build our defense capability in evolutionary steps. There must be deliberate synergism of multinational assets on hand. We certainly agree that there are many spinoffs and technology both ways, both from SDI into the tactical arena and there could be from the tactical the other way.

The Army is providing the foundation to develop credible extended air defense and must have a program approach that meets the concerns of the U.S. Army and Air Force—we cannot do it ourselves—and we must also meet the concerns of our allies, in whatever theater the interest might lie.

We are continuing initiatives to address these defenses and also we are certainly supporting General Abrahamson.

Sir, that is the end of my statement.

[The prepared statement of General Wall follows:]

PREPARED STATEMENT OF LT. GEN. JOHN F. WALL, COMMANDING GENERAL, U.S. ARMY STRATEGIC DEFENSE COMMAND

Mr. Chairman, it is a pleasure to appear before you to discuss the Army's role in the Strategic Defense Initiative Program. Because our security is inextricably linked to that of our friends and Allies, the Strategic Defense Initiative Program cannot confine itself to ICBM's and SLBM's, but must also carefully examine potential technologies against shorter range tactical ballistic missiles and other tactical missiles.

The Army Strategic Defense Command is actively supporting Jim Abrahamson in carrying out the SDIO role in examining potential defenses for the shorter-range missile threat. As you know, the Army is preeminent in terminal defense and played a significant role in the early space programs of this Nation. These qualify the Army for the SDIO lead in tactical missile defense architectures and General Abrahamson has so designated it. This charter gives the Army Strategic Defense Command the primary responsibility for the development of technologies and systems for tactical missile defense. In coordination with the other Services and acting for and with SDIO, the optimazation of the systems existing in the theater of interest is the first step. Allied participation is also crucial to achieving a successful development and acceptance of an effective system.

Several studies examined how technologies derived from ballistic missile defense or air defense components could be used for defense against tactical missiles. Presently, there are studies focused on tactical ballistic missile defense, and others looking at the defense against cruise missiles; but there are none that currently integrate the aircraft, cruise missile, and tactical ballistic missile defenses into a unified network utilizing the widely divergent weapons systems existing in our hands and those of our Allies. Nontheless, our field commanders have made great progress by innovatively devising improvements to integrate U.S. Army and Air Force plans and day-to-day operations with each other and with those of our allies.

Tactical missile defense is a complex problem due to the composition of the threat: Ballistic missiles; ground, sea, and air launched cruise missiles; standoff missiles and aircraft. The inherent flexibility afforded this diverse threat accounts for the difficulty in developing an effective tactical missile defense. The overriding defense mission is and will continue to be deterrence of aggression. We currently achieve deterrence by threat of retaliation. Keeping fiscal realities in mind, we plan to build our defense capabilities in evolutionary steps. A major design goal of a tactical missile defense system is to control the level of conflict, that is to prevent runaway escalation and to contribute to the expeditious cessation of hostilities on terms favorable to the United States and its allies.

As I said, theater defense is very complex. We must deal with a diverse, massive integrated threat; we must synergize more effectively the efforts of several nations.

The U.S. Army cannot do it in isolation and must design a program responsive to the ATBM problem that addresses the needs of our forces and those of our allies. The Army is now providing a foundation upon which to develop a broadly based credible extended air defense of which ATBM is a subset. We need to continue the excellent cooperation among the DoD organization in the ATBM planning efforts. Finally, we need to finalize a program approach to the extended air defense problem that will meet the concerns of both the United States and our allies.

The Army is continuing a major initiative to address the tactical missile defense problem and the complementary air breathing defense problem. Like the initiative of the SDI, it is a bold first step toward a most worthy goal. Mr. Chairman, thank you for the opportunity to appear before you and your committee.

Senator **WARNER**. I will ask one question and then defer to Senator Thurmond.

What concerns me is that we are really on a threshold of a whole new generation of weapons.

Are we proceeding in a manner to minimize redundancy, which in some cases could be waste, with our allies?

In other words, what is the umbrella under which this is being examined? What is the mechanism with our allies by which we are looking at one another's technologies and deciding which has the best to go forward, and the like?

Mr. **IKLE**. Mr. Chairman, there are two main avenues where we seek to avoid such duplication.

One is our cooperation on air defense in the Alliance. We, for example, have a bilateral cooperative agreement, as I mentioned before, with the Federal Republic which provides the basis for undertaking some follow-on research to address common air defense needs.

Since ATBM is to be addressed as an extension of air defense, that is one basis for making sure we minimize or avoid such duplication.

Then there are potential cooperative arrangements under SDI that General Abrahamson may wish to address.

General ABRAHAMSON. Sir, I indicated, the cooperative program the allies are involved with is a very careful examination of what technologies they have and how they can be improved to work, to contribute to this overall problem of stragetic defense against ballistic missiles of all ranges.

They have an opportunity to examine our technology at the technology base level, appropriately so.

I think the sum of these two efforts does involve, first of all, a very extensive and deeper level of communication than we have had in many programs in the past.

Second, an opportunity to ensure in the future that there will not be this waste and duplication that you are concerned with.

Senator WARNER. But your platter is full. Your cup is full. Indeed, some of your technology may have direct application in this area.

It seems to me that we ought to consider putting together a formalized consortium, both at the civilian and military level, to bring this thing together because it could devolve into a program of a magnitude of what you have currently in SDI.

General WALL. Mr. Chairman, the Army is also participating in this and ATM activity in the NATO Air Defense Committee, and also the Army staff, Deputy Chief of Staff for Operations, along with a member of my command, are cochairing our input into the AGARD, which is the Advisory Group on Aeronautical Research and Development study for the NATO Development Committee.

So, we are looking at these areas at a different level also.

Senator WARNER. Senator Thurmond.

Senator THURMOND. Thank you, Mr. Chairman.

I want to commend you for the work which you are doing.

Mr. Chairman, this subcommittee has an outstanding record in support of the defense programs.

Senator WARNER. Thank you, Mr. Thurmond.

Senator THURMOND. Dr. Ikle, we are very pleased to have you and General Abrahamson and General Wall with us. I have been much impressed with the work of both these generals and have pride in the accomplishment we are making.

Dr. Ikle, are you satisfied there are sufficient funds to allocate to the development of an antitactical ballistic missile system in the current 5-year defense plan?

Mr. IKLE. Yes, Senator Thurmond, I believe we have an adequate allocation of funds, but it is important that we concentrate and focus this effort, as the chairman pointed out, and pull these various links together that we have with the allies. Also, we should stimulate greater effort on the part of the allies since it is a main concern to them.

[Additional information follows:]

Dr. Ikle. I would like to elaborate on my response to Senator Thurmond's question of whether I am satisfied that there are sufficient funds to allocate to the development of an antitactical ballistic missile system in the current 5-year defense plan. While I believe there is an adequate allocation of funds to accomplish advanced development for a short-term response to the tactical ballistic missile threat, I wish to point out that I am referring to near-term actions that will be undertaken as a part of the Army's Antitactical Missile [ATM] Program as it is currently structured.

The Current Army program will provide for Patriot modifications and will enable it to engage tactical missiles in flight and provide a limited area defense. The program also will result in improved cruise missile and antitactical missile capabilities for the Hawk system, but at a later date. Each of these system improvements is important, but the pace of their development, of course, is dictated by the level of funding. The Army's ATM improvements could be fielded sooner if more funds are provided.

Beyond these system upgrades, however, we are now examining the requirement for an antitactical ballistic missile capability to deal with the sophisticated conventional tactical missile threat the Alliance will confront in the 1990's, for which additional funding would be needed.

Senator Thurmond. General Abrahamson and General Wall, are you satisfied with the planning profile?

General Abrahamson. Sir, I believe the funding profile as laid out is indeed an adequate one.

Senator Thurmond. Inadequate?

General Abrahamson. Adequate, sir, in terms of strategic defense and our contribution to that portion of the problem.

I continue to be concerned, however, about what I believe is an inadequate understanding of the whole broad base and the requirement for research and investment that the SDI program has, that it has continued to suffer cuts in the Congress on the order of between 20 and 25 percent.

If those kinds of cuts continue in our future profile, then, obviously, this area will suffer as will the whole SDI program.

Senator Thurmond. General Wall.

General Wall. Sir, we are proceeding in the Army to integrate, going back to the first question by the chairman, integrate what is on the ground, and the different newer technologies, with what really is in operation over there today, the Patriot's, our ATCM's, and this sort of thing.

But there are fiscal realities within which we must work. There is no question that we are making the best use we can of the funds available and we could probably use additional funds if they were for allied participation in terms of cost sharing with the allies.

Senator Thurmond. General Abrahamson, what countermeasures are available to the Soviets now and in the future?

General Abrahamson. In the tactical or in the theater range weapons, sir? Is that the context of your question?

Senator Thurmond. Yes.

General Abrahamson. Right now they have not had to employ countermeasures in any significant way because, of course, we have not, with the exception of the Patriot upgrade and the improvements to Hawk, really attempted to defend against ballistic missiles.

So, at least at this point they are getting pretty close to a free ride in terms of what they might be able to do.

There are two different types of trajectories for ballistic missiles in the theater range. The longer-range missile, the SS–20 type of missile or future versions of those, go high and they have a similar trajectory to an ICBM and in that sense many of the technologies we are working on and many of the countermeasures that we are concerned with for a full SDI system would be available to the Soviets and the counters that we could find would be ways that we could deal with those.

There is another set of tactical missiles that have low-altitude trajectories and provide shorter flight times. Now, those are more difficult for the Soviets to employ countermeasures against by putting up decoys.

On the other hand, they can use such things as electronic warfare against some of our missile systems. Therefore, I believe we should apply more sophisticated seekers for these things in the future in order to avoid their being able to deploy countermeasures.

The game is to prevent them from doing that, primarily by showing that you can counter them.

Senator **Thurmond**. General Wall, what kind of costs are we talking about for an antitactical ballistic missile system to reach deployment?

General **Wall**. Sir, I am ill-equipped to answer that. As I mentioned before, we are in a research mode in my command. I can do the research and provide that for the record.

[The information follows:]

General **Wall**. The United States must decide to develop an antitactical missile system using one of the technologies that we all develop before an appropriate cost estimate can be determined. The current Army position is, however, that a tactical missile interceptor would only be a part of a synergystic defense that includes passive self defense measures; field artillery, special operations forces, and offensive counterair operations; and, terminal interceptors to provide tactical units defense.

Senator **Thurmond**. General Harrison.

STATEMENT OF BRIG. GEN. JERRY C. HARRISON, DEPUTY CHIEF OF STAFF'S OFFICE, RDA, U.S. ARMY

General **Harrison**. Sir, I can give you an example of the Patriot missile system that we are upgrading to take on the antitactical missile threat.

We have programs of $120 million for R&D to do that, currently $23 million in the fiscal year 1985 budget for that purpose. The 120 I gave you takes us out to fiscal year 1988 and beyond.

Senator **Thurmond**. Thank you.

General **Abrahamson**. Sir, I think that has to be put in context. That particular system is a very effective terminal self-defense system. It does not constitute a layered kind of defense which would bring up the capability that would be required, I believe, in the long term for a truly deterrent kind of system.

So, I believe that while those numbers give you a good initial idea of a partial capability, they do not go as far as would be required in a layered defense.

General **Wall**. We would have to provide that for the record, sir.

[The information follows:]

Theater missile defense is a complex problem due to the composition of the threat: Ballistic missiles, cruise missiles, standoff missiles and aircraft. The inherent flexibility afforded this diverse threat has accounted for the difficulty in developing an effective tactical missile defense. The overriding defense mission is and will continue to be deterrence of aggression. To achieve this, we plan to build our defensive capabilities in evolutionary steps, integrating aircraft, cruise missile and tactical missile defense into a unified network.

The Army Strategic Defense Command is providing a foundation upon which to develop a broadly based credible terminal defense that will be responsive to the concerns of both the United States and our allies. Defense concepts and mission requirements must be determined before technology and system developments can be identified for a theater missile defense program. We seek defensive options, as with other military systems, that are able to maintain capability more easily than countermeasures could be taken to try to defeat them. This criterion is couched in terms of cost-effectiveness. However, it is much more than an economic concept.

Allied contributions could reduce both the schedule and the cost of the research program. It would be premature to speculate today what the cost of such a defense might be. As we progress in our program, the cost to develop the terminal portion of theater missile defense can be determined. At that time, we will be very happy to provide cost information, however, to attempt to do so today would only be speculative and possibly misleading.

Senator THURMOND. Thank you very much.

SOVIET ARMS CONTROL VIOLATIONS

Dr. Ikle, my next question concerns another matter that has caused me a great deal of concern. It has to do with Soviet arms control violations. About 25 years ago you coined the term "restorative measures" to address arms control violations. You were quite prophetic.

The Department's term today is "proportional response," I believe. The Soviets are violating various arms control agreements with impunity and we are doing nothing.

Why should the Congress continue to fund a futuristic defense system when nothing is being done in the near term to deter or address Soviet violations that pose a significant threat to our security?

Mr. IKLE. Senator Thurmond, I very much agree with you regarding the seriousness of the Soviet violations. These violations pose a terrible corrosive threat to the whole arms control process. It calls into question the meaning of future negotiations.

If our negotiators sit down and work out a treaty, they have to recognize that this or that article may simply be knocked out by the Soviets later by being violated.

What is the purpose of the painstaking work that our excellent negotiators are performing in Geneva if the Soviets can later on, without consequences, unravel these agreements and violate whatever article they do not like? Then the critical parts of the whole package that they negotiated no longer fit together.

It is for that reason that President Reagan has reviewed this problem. He has been the first President that has drawn public attention to these violations and their seriousness. First, he had to examine carefully what specific response we could undertake.

Here, Senator, you have to recognize that the responses we can now undertake are constrained by virtue of the fact that our planning of the strategic forces for years, for the last decade, was guided by our belief that the arms control agreement would be abided by and that we, of course, ourselves, would adhere to those treaties. That is to say, we did not store up and prepare programs that would be in violation of the treaty that we could leverage over into once the Soviets violated the treaty. That is, of course, the situation that the President has to confront on this issue.

Senator THURMOND. General Abrahamson, I want to say I am a strong supporter of SDI. When eight Senators went to Russia last year prior to the Summit, we spent 3½ hours with Mr. Gorbachev. I cannot imagine President Reagan giving anybody over 30 or 40 minutes.

The reason he took that much time, in my opinion, is that he was trying to sell us on the theory that we ought to demilitarize space. The distinguished chairman of the subcommittee was present and knows what took place.

He went over and over and over on that subject. We discussed the matter and told him that we wanted peace and hoped they did, and so forth. During the entire time he was emphasizing that point. That is the reason he gave us 3½ hours.

I became convinced he was afraid that we would develop SDI first and could knock down their missiles before he could knock down ours.

When I came back and we met with the President at the White House, I told him, "Mr. President, I hope you will not abandon SDI. I believe that is our ace in the hole." I went on to explain to him what happened in Russia. I feel that way today.

I just want to ask you this question.

From the work you have done so far, are you still convinced that we can develop SDI to be successful and can we do it within reasonable time and cost factors?

General ABRAHAMSON. Sir, first of all, I appreciate the perspective and your statement of the importance of our efforts. I think you stated it simply and very well and I am gratified for that.

I am convinced that we can develop a strategic defense that will grow to the capability that our first and initial objectives were and that with reasonable funding, we can bring the necessary information forward for an informed decision by the Congress of the United States and to a future administration by the early nineties.

We would like to speed that up and we have thousands of people around this country who are working desperately to do exactly that. It will depend, of course, on the success of the research. An important and vital element of that, in my judgment, is that this is a research-to-cost program. It must be affordable, otherwise, it is not a reasonable option for us to bring to you, the Members of the Congress.

So, that is the way we have structured the program. I have committed to this committee that we are working now on cost goals for many of these systems and that we will be in a position by the next year's budget to have presented those cost goals so that you can begin to see where it is that we are going.

We have set some already. For example, one of the missile systems that is coming along very well is called ERIS. It is under the management of General Wall and his Army team. The cost goal for that system is $1 million or less for a full operating round.

That is just an example of one that we can set now.

So, my intent in structuring the program this way is to be able to ensure it can be affordable for this Nation.

Senator THURMOND. I am very pleased that the President did not weaken on that at the summit.

Mr. Gorbachev said to us:

> If you put on the table one day to demilitarize space, we will put on the table the next day to radically reduce the long-range missiles and intermediate-range missiles.

Of course, that is what he was trying to emphasize prior to the summit. I am very pleased that President Reagan had the courage and vision not to take that action.

Now, I have to go to another meeting. I have just one more question for Dr. Ikle.

Dr. Ikle, what restorative measures or proportional response can we take to correct the current problems we face?

Mr. IKLE. A range of measures will have to be addressed in the future as the Soviet violations gain more in military importance, depending on the type of violation.

For example, as they keep expanding their violations of the ABM Treaty, we, of course, have to emphasize our effort on SDI. For the interim period we should consider whether our retaliatory capability remains viable and whether adjustments are needed in our air-launched cruise missiles to make sure that we continue to maintain a viable second strike capability.

I think the greatest damage, Senator, as I tried to point out in my previous reply, is perhaps not so much the military capability that in the short term the Soviets gain over us, but the destruction of the arms control process—how they render meaningless any future agreement if we have to count on the fact that important articles in that agreement that they do not like will simply be brushed aside with impunity by their future violations. That is the effect of the violations that we have to keep in mind above all.

Senator THURMOND. Thank you very much.

Again, I want to thank you gentlemen for the fine work you are doing.

Mr. Chairman, thank you for your courtesy.

Senator WARNER. Thank you very much, Senator Thurmond.

Senator Levin.

Senator WILSON. Could you indulge me? I have to be at another hearing at 10 o'clock. Can I ask a single question?

Senator LEVIN. I will be happy to yield to you for 10 minutes.

Senator WILSON. Thank you very much. I appreciate that.

SDI TECHNOLOGIES

General Abrahamson, listening as well as reading the testimony with intense interest and recently at another hearing I probably was guilty of brow beating a little bit. I do not like the role and I may engage in it again, but what I hear is that there are a number of interesting technologies. All the statements today acknowledge the threat which, to give credit where it is due, I think Senator Quayle has particularly well adduced with the chairman in the hearings—this is the second on this subject now and I think they are providing a fine service.

My problem in all of this, even though I am encouraged by the more explicit recognition of the problem and, as stated, the determination to address it, I do not find anything yet in the actual structure of the SDI Program that does. You are making a persuasive case that SDI technology can have a great many applications to the antitactical ballistic missile problem.

Yet I find statements that we will be better informed by the allied effort, that we have over the past years—this is the final statement in your presentation this morning—that:

> Over the past several years DOD has conducted a program aimed at countering the tactical missile threat. Although limited by technology to coping with only the shortest range conventionally armed missiles, it nevertheless is providing a foundation for development of a more broadly based effort to develop a credible defense for our allies consistent with the SDI goal.

I do not find in the present structure, in the program, anything that I can really call an integrated system of the kind that Manfred Wörner is so thoroughly describing as necessary.

It would seem to me that we are not only developing this for our NATO allies and those allies in the Middle East and the Far East, but for U.S. targets vulnerable to short-range missiles launched from submarines. It just seems to me that we are talking in a broad general aspect, but there is not anything yet underway.

Now, when you answered Senator Thurmond, you said there is adequate funding to do something. But I do not see a program aimed at specifically countering the threat. I have asked you whether that exists or whether we are not in fact in need of developing that and giving it separate attention and separate funding that I quite agree is consistent with SDI, but we have not got it.

The question is: Where will it be?

General **Abrahamson**. It does not exist as a single line item, Senator, that you can, therefore, separate it and see it. I think that is perhaps the most important element.

No. 1, if you will look at the architectural studies, and, by the way, I would be happy to provide to this committee or to you separately, if you must leave, today some of the results of those architectural studies so that you can begin to see that at the same time that we are working on basic technologies we are also working on the definition of the system.

That is a parallel research effort and we are doing that in all of these cases. All of our efforts which I pointed out just before you came, work toward improved guidance systems, lightweight gyros and lightweight rocket motors for various applications, both in tactical and long-range systems, the application of rail guns being used in the atmosphere and being used at slower speeds, but to counter these kinds of systems, those technology programs are started.

They are not named specifically as a theater range weapon, but in the basic technology areas there are many starts. Let me say, sir, it is not as mature in terms of overall thinking as I think we should be at this point in time. Therefore, I have been particularly pleased that many of our allies have been anxious to discuss how an initiative such as Minister Wörner's initiative, building up, can make use of spinoff technologies from SDI.

In addition to that, we have been discussing specific architectural tradeoff programs with our allies and with our U.S. contractors so that they can begin to see the structure of ballistic missile defenses. It is not as I would like, but it is there.

Senator **Wilson**. You make note in your statement of contracts which SDIO has pursued with the British and with the Federal Republic of Germany.

Do those relate to a tactical weapon?

General **Abrahamson**. Not specific tactical weapons yet. They are technology programs. However, there are contract discussions going on now with several counties in terms of the architecture and the architectural tradeoffs which are really the glue that puts this whole structure together that you are seeking and I am seeking, sir.

Senator **Wilson**. You are talking more than simply upgrading of Patriot and Hawk systems?

General **Abrahamson**. Yes, sir.

Mr. **Ikle**. I agree with you, Senator Wilson, that the time has come to give more focus to the short-range missile threat, just as General Abrahamson described. Whether it is the idea that Chairman Warner mentioned, a formalized consortium or whether we should do it building on the air defense cooperation in the alliance that is going on, I think is something we should decide quickly.

We also have, as I mentioned before, allied cooperation in upgrading air defenses. The agreement with the Federal Republic of Germany in 1983 provides that the Federal Republic will commit $50 million for air defense improvements and, of course, we want to build on that, as explained by several European defense leaders.

So, in a way we come at it from both sides, from the advanced technology in research in SDI and from the air defense systems that already exist and are being upgraded and later on being given capability against tactical ballistic missiles. I do not dispute your sense of urgency at all. I agree.

General **Wall**. Sir, we share that sense of urgency in the Army. Although we are doing something we need to do more. The Training and Doctrine Command of the Army is getting together an operational concept. We are holding various conferences. We are getting various studies to attack the problem.

It is getting quite a bit of interest within the Army to get something going on that. We have programs that will upgrade Patriot and Hawk to accomplish some tactical missile defense. The FRG and the Netherlands are getting Patriot. The Japanese will make Patriot under licensed production agreements, and we are having discussions with the Italians, Belgians, and others.

The fact of the matter is that we need to get going. The Army recognizes this and we are starting on another plateau in that area.

Senator **Wilson**. I am delighted to hear that because I think there is real urgency because the need is genuine in virtually all theaters. I also think there is a great opportunity to substantially enhance the support for a cooperative effort, not just in development of the tactical response, but for SDI generally.

This is something in which the allies have a very real stake and they know it. I think it is not inconsistent with our longer term goals in SDI. It seems to me it is a very significant opportunity to build a base for cooperation and support.

Thank you, Mr. Chairman.

I thank Senator Levin.

Senator **Warner**. Thank you.

Senator Levin.

Senator **Levin**. Thank you, Mr. Chairman.

First, just a few questions on ATBM.

Is there an established requirement for the ATBM yet?

General **Wall**. Colonel Alcala from Force Requirement will respond.

STATEMENT OF COL. RAOUL HENRI ALCALA, U.S. ARMY

Colonel **Alcala**. There is not a problem in terms of a defense concept, but there is in terms of the characteristics of the threat, both on the missile side as well as the air-breathing side which we cannot forget. Those problems are well known.

We have written requirements for those elements we know, using technologies with which we are confident, and have demonstrated, and which we can field effectively. These include full upgrades to existing missiles for air defense to give them capabilities against missiles in flight as well as missiles we will use and launch against the missile launchers and areas in which there are logistics and support facilities.

These include very important new programs such as the joint surveillance and target acquisition radar system, systems for integrating and fusing the information and getting it quicker where we need it, and an Army tactical missile system for direct attack to launchers.

We have essentially a system of systems. For those I just mentioned, not only are the requirements well known and written, but the programs themselves are launched. We have beyond that the open agenda of completing the identification of the threat which we have asked the intelligence community to upgrade through the next 10 years because we have learned that the threat has changed a lot in the last 3 years as everyone's testimony here and questions have made quite clear.

The initiatives that General Wall has with our allies, that General Abrahamson spoke of are all things we are trying to capture. We have in place in the Army, the management structure and top-down guidance necessary to carry that through.

As General Wall and others have mentioned, the Army is not going to do it alone.

ESTABLISHING A NEED FOR ATBM

Senator **Levin**. My question is a simple question: Has the military established a requirement for ATBM yet?

I guess the answer is no.

Colonel **Alcala**. No.

Senator **Levin**. I am not going to ask you why. I just want to know whether we have established a requirement.

Mr. **Ikle**. Senator, defense guidance does provide that ATBM be pursued.

Senator **Levin**. In the sense we use it, we have not yet established a military requirement for the ATBM?

Mr. **Ikle**. In a formalized sense.

Senator **Levin**. Therefore, the Joint Chiefs have not reviewed any proposal to establish a military requirement for the ATBM yet; is that correct?

Mr. **Ikle**. I could not speak to that.

Senator **Levin**. General Abrahamson, do you know if the Joint Chiefs——

General **Abrahamson**. We will have to give you that answer. The Joint Chiefs, of course, in many of their discussions have dealt with such things as concern against the air-breathing threat, air defense in Europe, and the air defense for ships in many of those areas. I think we will have to get you a more accurate answer. I know that they have had a series of those kinds of discussions. Whether or not it is in the context you asked the question——

Senator **Levin**. You are not sure whether or not there has been a proposal to the Joint Chiefs yet to establish a formal military requirement for ATBM?

General **Abrahamson**. That is the part I want to answer accurately for you, sir.

Senator **Levin**. For the record?

General **Abrahamson**. Yes, sir.

[The information follows:]

General **Abrahamson**. The Army identified the need to counter the increasingly sophisticated tactical missile (TM) threat to NATO forces in its Justification for a Major System New Start (JMSNS) that was approved in 1982. This document described a variety of functions and systems that would be required to accomplish this defense that included, detection, identification, early warning, launch suppression, missile intercept, and passive countermeasures. We are in the process of defining an antitactical missile system that will be needed to address the sophisticated tactical missile threat discussed earlier.

Senator **Levin**. Do we know whether or not NATO has established a formal force goal or requirement for the ATBM?

General **Wall**. The partial answer, sir, is that General Rogers has a conceptual military framework for ATBM. He has done that. A new edition of that will be out soon.

As to the previous question, there are JCS working groups looking at the ATBM issue. A formal requirement with a capital R has not been established for the ballistic missile interceptor of an ATBM system.

Senator **Levin**. Do you know whether NATO has established this force goal or requirement formally yet?

General **Wall**. The answer is no again, a short answer.

Senator **Levin**. Thank you.

General Abrahamson, just a couple of questions on the process in SDI.

I understand the annual report for SDI was due March 15 or 25, but has not yet been received.

When will that be received?

General **Abrahamson**. It is in final coordination between the agencies at this point. The report is a very complete report. It includes both policy issues, treaty compliance issues and others. That is extending and we are late because of the extensive interagency coordination that is required.

Senator **Levin**. When will that be received?

Mr. IKLE. The Secretary hopes to be able to send it to you within a matter of weeks.

Senator LEVIN. Mr. Chairman, this report was due on March 15. It is already a month late. Our budget process is underway. The purpose of that March 15 date was to give us that report prior to markup in adequate time so that we could consider it.

To say in a couple of weeks means that we will probably be in markup before we get the report which violates the date we set, and No. 2, the purposes of the date we set.

Why can't we get that on time?

Mr. IKLE. Let me see if we can further accelerate it. There is an unfortunate delay, as General Abrahamson pointed out. You are quite right, it should be with you now.

Senator LEVIN. General Abrahamson, there were questions asked for the record in the March hearing by a number of us.

Do you know when we will receive the answers to those questions?

General ABRAHAMSON. Some of them should have been delivered already. I will have to give you a specific accounting on where they are, sir.

Senator LEVIN. And we will be receiving answers to all our questions?

General ABRAHAMSON. Yes, sir.

SOVIET TREATY VIOLATIONS

Senator LEVIN. Dr. Ikle, you talk about treaty violations by the Soviets. I think we all agree that the Soviets have violated treaties. The military significance of the violations is debatable at times, but I think we are all in agreement that there have been violations.

One of the charges we made against the Soviets is that they violated the threshold requirements that we had agreed to. But then we see in April a front page article in the New York Times saying that now the CIA changes the way it measures Soviet atomic tests and is questioning indeed whether or not our allegations that they violated the limits is in fact accurate.

Are you familiar with that article in the New York Times?

Mr. IKLE. Yes, I have seen the article. I have also reviewed the various reports from the seismological experts regarding different methods for estimating the yield of Soviet underground tests, which is a very difficult thing to do with full confidence in one's accuracy.

Therefore, as you probe at this problem by definite methods, you may come up with different results. The report that the New York Times seems to have in mind really does not exonerate at all the Soviets from the violations.

It affected the number of violations or the yield that we estimated that these violations entailed. The administration's view about the fact of serious violations has not been altered.

Senator LEVIN. Do you concur we might have to lower our estimates of the yield of Soviet tests by 20 percent?

Mr. IKLE. Senator, this is a very difficult and uncertain science. I remember back as Director of the Arms Control Agency 10 years ago we had been going down on estimates of yield like waves in the ocean.

By a large margin, the ups and downs we have now seen clearly over the last 15 years indicate a pattern of the Soviets exceeding these yields.

So, the answer is, I do not know. It depends upon which seismologist you are talking about.

Senator LEVIN. I am asking about your own judgment.

Do you agree with what is apparently here in the CIA decision now that we have to lower our estimates of the yield of Soviet tests by about 20 percent? Do you agree with that?

Mr. IKLE. No, because I have seen contrary indicators and evidence which suggest that this particular seismological analysis in and by itself is inconclusive and therefore does not lead me to change my views.

Senator WARNER. On testing, this committee will be having a full commitee hearing on this subject next week.

Senator LEVIN. My time is up.

Senator WARNER. Mr. Cohen.

Mr. COHEN. Thank you, Mr. Chairman.

SA-X-12

Are you familiar with the Soviet testing of the SA-X-12?

General ABRAHAMSON. I am familiar with some of it, yes, sir.

Mr. COHEN. Is that, in your judgment, a violation of the ABM Treaty?

Mr. IKLE. We have complained to the Soviet Union about the SA-X-12 and expressed our concern to them.

Mr. COHEN. Why are you concerned?

My understanding is that they call that weapon their own version of an antitactical ballistic missile defense.

Mr. IKLE. Yes, they have called it that, but the capability, of course, is still in the testing mode. Hence the designator X. The capability of the missile is in question. It could have a capability against strategic ballistic missiles. It is not the intended capability that is addressed by the treaty.

Mr. COHEN. Does not the same thing apply to us?

When General Abrahamson said research, and, of course, the word research is not considered in the ABM Treaty, it is testing and development, that is part of the ABM Treaty, but when you say research, the ATBM is fully consistent with ABM, do you not run into the same kind of problem, what you called an antitactical ballistic missile, in fact, could be used in deployment for part of an ABM system?

So, are we not, in fact, running the same risk that the Soviets are doing now in terms of potentially undercutting or eroding the ABM Treaty?

Mr. IKLE. It is for that reason we have, of course, these ongoing discussions and the Soviets have indeed all the lables, and Senator Thurmond explained even at the meeting in Moscow they expressed their concern about what we are doing.

We have not reached a finding that the SA-X-12 is a violation. We are open to listening to Soviet concerns about what we are doing and trying to explain to them that this is within the treaty. We want to make sure that they have this assurance on an part and we request the same from them.

Mr. COHEN. The difficulty is both sides are contributing to the erosion of the ABM Treaty by proceeding because each might potentially have the capability of being used for strategic systems as well as tactical systems.

Is that not so?

Mr. IKLE. Our main concern really on the erosion of the treaty is more related to things that are clearly for the strategic missiles like the Krasnoyarsk radar. We recognized back in 1972 when the treaty was drafted that you do have to manage this borderline between tactical and strategic.

Mr. COHEN. Are we equally concerned that the SA-X-12 has an ATBM capability as a strategic missile?

Mr. IKLE. If it is deployed in a way that would give the Soviet Union significant antistrategic capability, then indeed, Senator, you are right.

Senator COHEN. Last year, Dr. Ikle, you testified before the committee and I would like to quote it. I think it is a good statement. You said:

> Although in the future NATO's main operating bases may be subject to attack by tactical ballistic missiles, currently programmed passive defense measures will assure bases are completely invulnerable to tactical ballistic missile attack even without antitactical ballistic systems.
>
> The Air Force has several passive defense systems underway which reduce the vulnerability of NATO's main operating bases, conventional and chemical ballistic missile attack, passive defense measures, including semihardened protective shelters, recovery services will protect aircraft from antiballistic missile attack.

Do we still have that sort of passive program underway that will allow us to continue to survive?

Mr. IKLE. General Abrahamson and General Wall may want to comment on this further, but we want to certainly complement the active defenses with passive defenses, with mobility and concealment. We do not expect that active defenses can do the whole job, nor do we expect the passive ones can do it. These are complementary.

Senator COHEN. Can I ask you whether or not the situation has changed significantly?

If you take the SA-X-12 which are nuclear tipped and you exchange those for the SS-22, which could be either conventional or possibly nuclear tipped, has the threat changed significantly if you exchange the 22's for the 12?

Mr. IKLE. Senator, the increase in accuracy, of course, makes the conventionally armed attack the threat. We expect that the coming generation of Soviet missiles will be far more accurate.

Senator COHEN. On a conventional level?

Mr. IKLE. And thereby make it possible to use conventional warheads to do significant damage.

Senator COHEN. The question I have: Do you really believe if the Soviets will launch either the 12 or 22, that we are going to wait on the ground to figure out whether they are nuclear armed or conventionally armed and then decide whether we will fire back with nuclear weapons?

Is that a practical realistic scenario?

Mr. IKLE. I am very glad you asked this question. It is a point I alluded to earlier that one of the great benefits of active defenses is that it can free us of this very, very dangerous situation where we may have to execute counterforce operations before we have fully determined the nature of the attack, in order to give us a chance for survival.

That is not a situation we want to be in. Therefore, having active defenses, we can defend ourselves against conventional attack and can use that defense without the risk of escalation.

Senator COHEN. General Abrahamson, in response to Senator Thurmond about his meeting with Secretary Gorbachev, he indicated that Gorbachev would agree to substantial reductions in offensive systems if we had restrictions or eliminations of defensive systems.

If you can get deep and verifiable reductions in the nature of an offensive threat to the United States, do you still believe we should have no restrictions or reductions in funding profiles of any other aspect of the SDI Program if you were satisfied with a significant and deep verifiable reduction in the nature of the threat against the United States were possible?

Mr. IKLE. There is a flaw——

Senator COHEN. I was addressing General Abrahamson——

Mr. IKLE. I am sorry.

General ABRAHAMSON. I think Dr. Ikle should add to that particular answer.

I think the first and important thing is that my responsibility is to ensure that we can have a defense that will ensure whether or not in the future what we think is verifiable or what we think will indeed modify their behavior and be continued modified behavior, that we can have the levels of safety so that you can in fact feel more comfortable and more secure having that kind of a very fundamental defense available to you.

We are trying to do more than merely reduce the number of offensive weapons. Surely that is one of the most important objectives that we can have.

In addition to that, we are trying to establish a strategy, a different kind of strategy, one that will be more stable and more stable in a crisis. I think we should not forget that part of the equation.

Senator COHEN. Given the nature of the threat that is perceived with the 22's and 23's, should we seek in the INF negotiations to ban them altogether, short-range and long-range tactical missiles?

You are talking about zero-zero. Why not deal with the ballistic missiles as well?

Mr. IKLE. As you know, Senator, we asked for restrictions of these shorter range missiles in the INF negotiations so that they would not create a measure of circumvention. These negotiations are difficult enough with the present problem of the INF missiles. I think it is wise not to try to do more in that one negotiation than we have set out to do.

Senator COHEN. If the nature of the threat is that you are substituting SS-20's, you are talking that threat away, but you are left with 22's and 23's, how much better off are you?

Mr. **Ikle**. I see logic in the argument. I think it will be a great gain if we reach the zero-zero agreement we propose. You are right, because we would have to address shorter range missiles as well as other uses of nuclear arms.

Senator **Cohen**. What restriction short of banning them would be acceptable, in your judgement?

Mr. **Ikle**. For the INF?

We have in various stages made clear that the interim progression to zero——

Senator **Cohen**. My question is on tactical ballistic missiles.

What restriction short of a ban would be acceptable?

Mr. **Ikle**. In tactical ballistic missiles short of a ban?

Since these are part of our negotiating position, I do not want to state what is acceptable. I think our current position is to try to seek, eventually to get to zero as the right way to go.

Senator **Cohen**. Thank you.

Senator **Warner**. Senator Quayle. You have been most patient.

ZERO OPTION

Senator **Quayle**. Thank you very much, Mr. Chairman.

I think Senator Thurmond touched on an interesting problem that you have with the zero option.

That is, what are we going to do about the 22's and 23's that have the conventional and strategic capability?

We are not able to verify which is which. If, in fact, you would not have an INF deterrence, our tactical deterrence with P-2's and GLCM's—and the Soviets SS-20's, there you would have an advantage. The Soviet Union still would have a clear advantage with the other ballistic missiles.

If they agreed to get rid of all the 20's they would still have the 22's and 23's that have both nuclear and conventional capability. I think this clarifies why it is so important that we get some active defenses.

That is precisely what Dr. Wörner in his article is talking about. I was intrigued by Senator Levin's question about whether we have a military requirement for an ATBM. I would hope that we will get that requirement. If it does not exist right now, it is very important to develop.

Senator Levin also asked if NATO has a requirement. I can tell you the French have a requirement. I presume that you read in Aviation Week what the French are pursuing in the way of an ATBM:

> Conduct a preliminary study on an ABM system that is to become part of the advanced European work to counter Soviet weapons such as 21's, 22's and 23's employed as part of the USSR short-range nuclear force.

So, the French certainly see this as a real threat; and as a matter of fact we are doing something about it. They appear to be ahead of us on this issue.

I would like to place these articles in the record.

Senator **Warner**. Without objection.

[The articles referred to follow:]

[From Strategic Review, Winter 1986]

A MISSILE DEFENSE FOR NATO EUROPE

(By Manfred Wörner)

IN BRIEF

Although definitive judgments must await the ultimate findings of the research effort, the U.S. Strategic Defense Initiative carries positive implications for the NATO Alliance as a whole, particularly in light of existing capabilities and continuing efforts by the Soviet Union in the arena of defenses against ballistic missiles. Meanwhile, however, a more imminent threat casts its shadow on NATO Europe: the growing Soviet capacity, afforded by technological advances, to employ their massive arsenals of mid-and short-range missiles as conventional firepower against prime NATO targets heretofore assigned to attacking aircraft or nuclear forces. This new dimension bodes to give the Warsaw Pact the capacity to launch an overwhelming attack beneath the nuclear threshold, while—in combination with active defenses—foreclosing or blunting NATO's nuclear options. The urgent and practicable answer to this threat is an anti-missile defense for NATO Europe, to be erected through incremental improvements upon existing air defense capabilities. Technology already points the way toward such a nonnuclear defense, consistent with both NATO's fundamental security requirements and arms limitation objectives.

Nearly three years have passed since President Reagan, in his speech of March 23, 1983, gave his vision of a strategic defense against nuclear missiles—a vision which subsequently inspired the U.S. Strategic Defense Initiative (SDI). For over two years, research has progressed under the direction of the Strategic Defense Initiative Office (SDIO). A multitude of contracts has been extended, and initial results of the research effort have been publicized.

The reasons which brought the United States to SDI are of significance also for the security of its NATO allies in Western Europe. Those reasons are related above all to the fact that the American concept of mutual arms restraints, which underlay the SALT Agreement of 1972, has not been realized in the meaningful limitation and reduction of strategic-offensive capabilities that had been anticipated by the United States and its allies. To the contrary: SALT I was followed by a large buildup in the strategic capabilities of the Soviet Union, which inevitably forced a commensurate modernization of American strategic forces. The Soviet Union has not accepted—either in its declaratory policies or its weapons programs or deployments—the concept of deterrence through mutual assured destruction (MAD). Instead, the Soviets have continued energetic work on anti-missile defenses.

SDI AND THE ALLIANCE

The condition of approximate parity in strategic-offensive weapons, along with Soviet anti-missile defense programs, carry direct implications for the security of the West as a whole and especially of Western Europe. In this situation the United States has determined to address a comprehensive research program to the question of whether technological advances offer the possibility that the nuclear threat may be neutralized no longer with the threat of retaliation, but with active defenses.

The Government of the Federal Republic of Germany issued the following statement on April 18, 1985: "The American research program is justified, politically necessary and lies in the interest of the security of the West as a whole." [1] This position of the Government of the FRG remains unchanged. It is clearly in the interest of the Federal Republic, and of Western Europe more broadly, that the SDI research program be pressed forward. Only on the basis of solid technological findings can the decision be made whether a defense system is technically feasible and financially practicable. Beyond questions of feasibility and practicality, the determination must be made whether a relationship can be fashioned between offensive and defensive weapons that can lead to greater stability in the strategic nuclear arena and favor the reduction of offensive arms.

The continuing, heated controversy over SDI cannot obscure the fact that these questions can be answered today neither with a confident "yes," nor an absolute, moralizing "no." Meanwhile, the participants in the debate must guard against the danger of denigrating, and thus undermining, a strategy of deterrence based on offensive weapons that must continue to be valid until an alternative becomes viable.

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[1] *Bulletin der Bundesregierung*, No. 40, April 19, 1985, p. 342.

No one can predict today the likely developments—and decisions—over the coming years with respect to strategic missile defenses. Meanwhile in the NATO context, however, another development is imminent and fraught with significance for Western Europe's security. The Soviet Union is in the process of adding a new component to its offensive capabilities which has the potential of decisively shifting the military balance in Europe in Moscow's favor: namely, a massive threat exercised by nonnuclear missiles.

THE SOVIET CONVENTIONAL ATTACK POTENTIAL

In the past two decades the Soviet Union has spared no effort in expanding and solidifying the military foundations of its global strategy. Those efforts have applied to nuclear as well as conventional armaments, to land and air forces as well as naval forces.

While the attention of the West was captivated, in the mid-1970s, by the buildup in Soviet strategic forces, as well as the dramatic rise in Soviet naval capabilities, the Soviets also inaugurated a substantial expansion and modernization of their ground and air forces, along with their mid- and short-range nuclear capabilities. NATO's deployment of Pershing-2 and cruise missiles, beginning in late 1983, has represented an at best limited counter to this massive, across-the-board Soviet missile buildup.

The Soviet Union has always endeavored to optimize all of its military forces for the successful offensive in the event of war: this has applied fundamentally also to Soviet nuclear forces. Still, a clear and abiding Soviet goal has been the ability to achieve victory in a European conflict with conventional forces.

Moscow has exploited its expanding conventional capabilities in its propaganda campaign against the NATO intermediate-range nuclear force (INF) deployments by repeatedly calling for the renunciation of a first use of nuclear weapons. Such a no-first-use agrement would have the effect of elevating the conventional superiority of the Warsaw Pact into a decisive strategic factor in Europe, thus increasing rather than diminishing the danger of a (conventional) conflict. Deterrence of conflict demands, however, the prevention of the use of any and all weapons. The NATO Alliance therefore gave the following, solemn affirmation in its Bonn Declaration of June 10, 1982: "None of our weapons will ever be employed except as a response to an attack."[2]

Soviet ground, air and naval forces are armed with a variety of weapons systems that can be deployed with conventional, chemical and nuclear munitions. [3] Beyond that, the Soviet Union possesses 441 mobile SS-20 missiles (not counting additional "reloads"), of which approximately 250 are targeted on Western Europe, each armed with three warheads, as well as a growing number of follow-on systems to the older Scaleboard, Scud and Frog missiles. These modernized SS-21, SS-22 and SS-23 missiles—with ranges of 150, 900 and 500 km, respectively—are distinguished by markedly improved accuracies. They can be employed more effectively than their predecessors with conventional—as well as chemical—warheads.

EMERGENT NEW SOVIET OFFENSIVE OPTIONS

In the coming years, the Soviet Union can be expected to achieve substantial improvements in such realms as surveillance, target acquisition and weapons guidance, and to press ahead in the technologies of missiles and "smart" submunitions. In the process, all varieties of Soviet missiles will gain further potential for use as conventional weapons. Especially at the outset of a conflict, such conventionally armed missiles would decisively widen the spectrum of employment options for Warsaw Pact air and artillery capabilities against operational and strategic targets in NATO's depth.

In short, these advances are opening to the Soviets a potent alternative to the use of nuclear and chemical weapons. Marshal Ogarkov pointed to the advantages of this alternative already in May 1984, when he was still Chief of the General Staff of the Soviet Armed Forces:

> Rapid changes in the development of conventional means of destruction and the emergence in the developed countries of automated reconnaissance-strike systems, long-range high-accuracy terminally guided combat weapons, unmanned aircraft,

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[2] Ibid., No. 66, June 30, 1982, p. 581.

[3] NATO has no corresponding option to the Soviet deployment of missiles with chemical warheads. To be sure, in the event of a substantial deployment of such weapons, the Soviets would have to accept the risk of escalation; it would confront NATO with the choice of reacting "only" at a commensurate level or responding with nuclear escalation.

and qualitatively new electronic control systems make many types of weapons global and make it possible to increase sharply (by at least an order of magnitude) the destructive potential of conventional weapons, bringing them closer . . . to weapons of mass destruction in terms of effectiveness. The sharply increased range of conventional weapons makes it possible to extend immediately active combat operations not just to border regions, but to the entire [enemy] territory, [something] which was not possible in past wars.[4]

The Soviet Union is thus attaining a qualitatively new capability for executing the "conventional fire-strike"—namely, the capability to destroy with conventionally armed missiles a large number of important military objectives in NATO territory that must today be assigned to Soviet nuclear weapons or to fighter-bombers in a nonnuclear role. Such targets include NATO airfields, special weapons storage sites, radar installations and air defense systems—as well as ports and other infrastructure for NATO reinforcements, weapons and munitions stockpiles, command centers and headquarters.

If the Soviets were to try to engage these targets today by conventional means, they would first have to launch heavy air attacks in order to rip gaps into NATO's air defenses, while also knocking out NATO airbases that host fighter aircraft. Once the Soviets are in a position to carry out these missions with missiles, they will reduce NATO's effective response-time to the attack, while exploiting the greater penetration of missiles compared to aircraft. Moreover, in this scenario the Soviets will be able, in the decisive first phases of the battle for air superiority, to free their fighter-bombers for other important missions. It might be added that the option of "surgical strikes," which in the past has been attributed strictly to Soviet nuclear strategy, would thus gain ominous meaning in a conventional context as well.

By concentrating missile strikes on prime NATO targets over massively attacking Warsaw Pact air and ground formations, the Soviet Union could prevent, delay or obstruct numerous NATO response options in the critical initial phase of a conflict. Thus, an orderly mounting of NATO defensive operations with emphasis on forward defense, the inflow of ground and air reinforcements from abroad, freedom of maneuver in the rear areas, as well as the Alliance's capacity for nuclear response—above all, the air-delivered components of that response—could be substantially disrupted and compromised, if not prevented entirely.

In all, the enhanced capacity provided by conventional missile firepower would enable the Soviets to launch a devastating attack below the nuclear threshold. In the process, pressures would build on NATO to escalate to a nuclear response. The Alliance has long endeavored to reduce its reliance on early resort to nuclear options: this accounts for the high priority that has been assigned in recent years to improvements in NATO conventional defenses.

All these considerations give urgency to a search by the Alliance for the means to cope with the new threat represented by Soviet missiles armed with conventional warheads. The basic question to be confronted is whether the threat can be adequately countered with strictly passive defenses and heightened mobility, or whether it calls for active defenses.

THE DEFENSE EFFORTS OF THE SOVIET UNION

Beyond these augmented Soviet conventional attack options in Europe, another development casts its shadow on NATO's security. The Soviet Union enjoys today substantial advantages in all known categories of defensive measures and armaments—advantages that have accrued from systematic and comprehensive Soviet programs over the past twenty years. The spectrum of those Soviet efforts extends from a nationwide system of civil defense, over air defenses, to strategic defense against nuclear missiles.

Ringing Moscow today is the only operational ABM system in existence. The system has been steadfastly modernized in recent years in all of its components—radars, launchers and interceptors. The Soviets dispose over a comprehensive air defense system as a substantial barrier against NATO aircraft, notwithstanding the latter's partial equipment with penetration aids and anti-radiation missiles. Not only in the Soviet Union putting in place an extensive early warning system, but its modernized radar installations enhance the capability for identifying, tracking and targeting incoming ballistic missiles. It is possible that the combination of ground-to-air SA–10 missiles and modernized radars already is providing the Soviets with a defense capability of greater effectiveness than that represented in the present ABM system around Moscow. Moreover, the Soviets are testing the ground-to-air

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[4] Translated in "The Soviet Strategic View," *Strategic Review*, Summer 1984, p. 85.

SA-X-12 missile—a mobile system which, according to Western analysts, is designed to defend against Lance, Pershing-1A and Pershing-2 missiles.

If the Soviets were able to put around the European part of Russia an anti-ballistic defense system of even limited effectiveness, NATO's capacity for exercising even its limited nuclear options could be substantially compromised—and the credibility of the Alliance's nuclear deterrent would thereby be seriously weakened.

BASIC COUNTER-ALTERNATIVES FOR NATO

In combination, these looming developments on the Soviet side—offensive options augmented by conventional missiles, and defenses against ballistic missiles—portend decisive advantages for Soviet strategy in Europe. Those advantages could lead planners in Moscow to the calculation that a successful conventional attack can be launched in Europe, while any NATO measures of nuclear escalation would be prevented or minimized. In light of the approximately parity between the superpowers at the strategic nuclear level, the Soviets could thus transform their nuclear superiority in Europe into nuclear dominance.

How can NATO counter these threatening developments? In search of an answer, some basic considerations must be taken into account:

A Soviet capability in effect to preempt nuclear escalation with a conventional offensive can be offset by the Alliance only through necessary improvements in NATO's conventional forces.

A Soviet capacity to employ active defenses for blunting NATO's nuclear options—including selective options for "conflict termination"—could be countered by NATO, at least theoretically, with appropriate increases in offensive systems, i.e. Pershing-2 and cruise missiles. This solution, however, is ruled out on practical grounds: aside from its questionable strategic value, it is not politically viable.

The only politically and strategically acceptable alternative for NATO, therefore, is a direct defense against Soviet missiles.

CRITERIA FOR A NATO MISSILE DEFENSE

A defense against attacking missiles is consistent with—indeed, reinforcive of—the defense cast of the NATO alliance. Such a the defense could only contribute to the stability of the military relationship between the opposing blocs in Europe.

Acquisition of such a defense capability has to be a common Alliance initiative. It should be seen in the context of a strengthening of NATO's conventional defenses; thus it represents a special challenge to the European members of the Alliance. Yet, it cannot be a purely European decision or project. The United States must be involved, not only because she bears a substantial share of the integrated air defenses of Western Europe, but the large U.S. force presence on the Continent also yields a direct interest in safeguarding those forces from the enhanced conventional threat generated by Soviet missile capabilities.

Basically a defense against the Soviet missile threat might be accomplished in several ways:

Through passive measures of protection for likely targets of a Soviet missile attack.

Through the destruction of Soviet missiles before their launch.

Through the interception of the oncoming missiles before they reach their targets.

These possible measures are not mutually exclusive, but rather complementary and mutually reinforcive.

A number of considerations seem to apply to questions of quality and priorities with respect to such defensive capabilities. Briefly enumerated, they are the following:

1. The anti-missile defense must be non-nuclear. It will be directed primarily against conventionally armed missiles; therefore, a nuclear defense—especially to the extent that it might entail first use of nuclear munitions—is out of the question.

2. The objective must be, in the first instance, a point-defense of priority targets on NATO territory based on the assumption that, within the framework of conceivable military operations, the Soviets will use conventionally armed missiles against such military targets.

3. The overall defense need neither be impenetrable, nor cover Western Europe comprehensively in order to have strategic effect. Even limited defense capabilities would fulfill the objective of introducing the needed, inhibiting uncertainties into Soviet calculations regarding the likely success of their offensive options.

4. The anti-missile defenses must possess high survivability. They must be tied into the NATO air defenses, so that neither the missiles themselves, nor their radars and guidance centers, can be put out of commission by attacking aircraft. In

order that the anti-missile and related anti-air missions be carried out as flexibly as possible, the weapons systems should be made dual- or multi-capable for such missions to the extent possible.

5. The anti-missile defenses must be configured in such a way that the opponent cannot saturate them with only a part of his missile forces, and then use the remaining forces against prime NATO targets.

TECHNOLOGICAL PROSPECTS

Fundamental to all these considerations, however, is the urgency for NATO to erect such defenses. The technological advances of recent years point to the feasibility of the endeavor: the necessary technologies for upgrading existing air defense capabilities for use against cruise missiles, including aircraft-delivered standoff weapons, as well as against medium and short-range ballistic missiles, are either available or within reach. And this projection can be made irrespective of the expectation that current research in SDI will yield innovative "spinoffs" applicable to theater defenses.

The task calls for a process of incremental steps proceeding from existing air defense capabilities. Relevant technologies could be harnessed to this process in complete conformity with current NATO guidelines covering the exploitation of new technologies for strengthening the conventional defenses of the Alliance.

Several examples already point the way. Thus the United States is developing for the Patriot air defense system a limited self-defense capability against tactical ballistic missiles. Similar self-defense capability is also under consideration for the successor system to the Hawk missile. For several years, the United States and the Federal Republic of Germany have been engaged in the bilateral development of a new-generation air defense system for naval vessels effective against low-flying aircraft and anti-ship cruise missiles. The arming of available and planned airborne platforms with anti-tactical missiles (ATM)—or even anti-tactical ballistic missiles (ATBM)—could well come onto the technological agenda as well.

KEY QUESTIONS TO BE ADDRESSED

Given the lead-times of modern weapons development, the Alliance already must look ahead today to the projected threat environment of the next decade in order to set the requirements for an expanded NATO air defense—including anti-missile capabilities—in terms of weapons systems, means of surveillance and guidance systems. This task calls for the conceptual integration of existing assets and identification of the basic architecture of an anti-missile defense. Only in this fashion can the Alliance project the relevant systems requirements and research objectives, identify linkages between an anti-missile defense on the one hand and air defenses and SDI on the other, and thus determine likely overlaps, parallel factors, as well as contrasts.

A number of questions need to be faced in this conceptualization process:

1. Can the threat posed by missiles be met to any significant degree through improved measures of passive defense, including increased mobility?

2. Could a portion of NATO's air assets be assigned to the mission of attacking opponent missiles on the ground—especially to the extent that other current NATO air missions could be assumed by ground-to-ground missiles?

3. What would be the optimal mix—in terms of both operational effectiveness and financial considerations—of passive means of protection, designated air assets and anti-missile missiles?

4. What are the parameters of feasibility and likely effectiveness that can be projected for a terminal defense against short- and medium-range ballistic missiles?

5. To what extent might anti-ballistic missile systems—or components of such systems—be applied also to a defense against cruise missiles, including standoff weapons?

6. Could such systems also be given anti-aircraft missions—and thus dual- or multi-capabilities consonant with both technical criteria and financial means?

7. How might such systems, or their components, be "coupled" to a potential U.S. strategic defense system, with particular reference to the dimensions of surveillance, target acquisition and battle management?

The search for answers to these questions might well benefit from the results of the "architecture studies" in the second phase of the Strategic Defense Initiative.

The weighty question remains how the needed financial means for the proposed defense systems can be mustered by the NATO members. All of the NATO nations have recognized, and endorsed, the urgent requirement of strengthening the conventional defenses of the Alliance. It has been the burden of this analysis that the defense against attacking missiles is emerging as a central new element of this requirement.

In practical terms, there are two alternatives: the Alliance can provide new expenditures, or it can shift available resources in accordance with a new determination of priorities. Such difficult choices underscore the urgency for the Alliance to make a fresh assessment of the entire air defense question, and to arrive at a common concept and guidelines for its implementation.

The various strategic, economic, political and technological factors that have been discussed—including likely linkages between SDI and conventional defense in Europe—also argue that a common position be adopted particularly by the European members of the Alliance. However, such a common European stance would not, and should not, be prejudicial to the continuing and parallel development of bilateral and multilateral forms of technological cooperation between Europe and the United States.

IMPLICATIONS FOR NATO STRATEGY

For obvious reasons, active defenses in Western Europe against conventionally armed missiles cannot be limited to fending strictly against conventional warheads alone. The current and foreseeable technological state-of-the-art does not provide the means for identifying the "quality" of an incoming missile—whether it is carrying a conventional, chemical or nuclear warhead. In this respect, however, the potential capability provided by anti-missile defenses will be no different from existing NATO means of defense against existing dual- or multi-capable weapons systems in the Warsaw Pact inventory, such as aircraft and artillery.

It needs to be stressed that, according to current projections, an upgraded air defense in Europe will be based on the ground and in the atmosphere. There is no discernible requirement for stationing weapons systems or components in space, such as may eventuate in SDI. In that connection, it needs to be posited as well that, given the imminent threat that has been described, it is imperative to proceed with the building-blocks of an anti-missile defense in Europe irrespective of the ultimate decisions that may be made in the United States with respect to SDI.

To the extent that the proposed anti-missile capability would bolster the direct defense of NATO Europe in a significant realm, it would make an additional contribution to the prevention of war. Indeed, it would mark a continuing evolution in the Alliance's deterrent strategy away from the concept of deterrence based on the threat of nuclear retaliation to a concept based on the credible ability to convince the Soviets that a conventional attack in Europe has no chances of success—in other words, the concept of "deterrence by denial."

IMPLICATIONS FOR ARMS NEGOTIATIONS

This basic thrust of "security through credible defense" also demands a thorough reevaluation of the implications for the arms limitations and reductions policies of the Alliance. The key question is: How can a concept of arms limitations and reductions be fashioned consonant with the Western principle of undiminished security at the lowest possible level of weapons?

NATO must come to terms with the probability that East-West argreement may well be reached with respect to substantive strides in the limitation, or, even reduction, of nuclear arms—particularly in the realm of ballistic missiles. This portends, in turn, that conventional forces—and the conventional realm be consistent with the geostrategic requirements of both alliances. From the Western perspective, a "total symmetry" cannot be equivalent with strictly numerically symmetrical limitations and reductions.

Therefore, it will be imperative to find incentives to the Soviets to limit or even reduce capabilities that are clearly in the category of "overarmament." Experience has demonstrated that unilateral Western reductions represent a futile road toward this objective. Therefore, NATO must act according to the principle that the military balance hangs by the recognizable military capabilities and options of the Warsaw Pact.

The Alliance's defense strategy—as well as its arms negotiation policies—must be geared to the key objective of neutralizing the conceivable attack *options* of the Warsaw Pact. Only on the basis of an assured Western defense capability can the dialogue with the nations of Eastern Europe be intensified and expanded in search of greater overall stability in the East-West relationship.

This can be the only viable framework for NATO's policies addressed to peace and security—a framework that was already established by the Harmel Report in 1967. The proposed anti-missile defense for NATO is consistent with this framework.

The Alliance must act to meet the clear challenges presented by Soviet arms policies. It must devise those measures, under the rubric of war-prevention, that can provide the needed elements of its defense capabailities, as well as the prerequisites for meaningful and equitable progress in the control and reductions of arms.

AEROSPATIALE STUDIES MISSILE SYSTEM TO COUNTER TACTICAL SOVIET THREAT

(By Jeffrey M. Lenorovitz)

PARIS.—France's Aerospatiale is conducting preliminary studies of an antitactical ballistic missile (ATBM) system that could become part of an advanced European defense network designed to counter Soviet weapons such as the SS-21, SS-22 and SS-23 missiles deployed as part of the USSR's short-range nuclear force.

The French nationalized aerospace company is in contact with the Pentagon to keep U.S. officials apprised of the research because of its potential relationship with the U.S. Strategic Defense Initiative program, as well as to look for areas in which the company could become involved in SDI work.

The ATBM system would be a terminal defense for France and Western Europe, complementing U.S. SDI systems that are being designed primarily to counter the longer-range strategic ballistic missile threat to the U.S., officials said.

Studies on the antimissile system are at the "pre-phase A" preliminary definition stage, Aerospatiale Chairman Henri Martre said.

French government backing for the program is provided through the Direction des Engins section of the Delegation Generale pour l'Armement, and Aerospatiale is providing company funding for the evaluations as well.

Participating in the study efforts are Aerospatiale's Space and Ballistic Missile Systems Div. and its Tactical Missiles Div.

SYSTEM CAPABILITY

Aerospatiale envisions developing the ATBM program around an advanced surface-to-air weapon system whose capabilities would be expanded to give it antitactical ballistic missile characteristics.

The company's Tactical Missiles Div. already is developing an advanced surface-to-air system called Aster to meet 1990's aircraft and tactical missile threats.

Aster is a two-stage solid propellant missile that uses aerodynamic control until the final interception phase, when a mixed aerodynamic/direct thrust control system is employed for extremely rapid maneuvering.

Aster is being proposed in two versions for France's basic antiaircraft and antitactical missile requirements. The Aster 30 is a ground-launched versioin with a range of 30 km. (19 mi.), while the 12-km. (7.4-mi.) range ship-launched Aster 12 would be used to counter sea-skimming antiship missiles.

"By enlarging the capabilities of a new-generation surface-to-air system such as Aster to give it antitactical ballistic missile capabilities, we would evolve a system tailored to the problems of European defense, which are different than the SDI-type defenses being worked on in the U.S.," one French official said. "The flight times and trajectories of the tactical ballistic missile threats faced by Europe are different from the longer-range ICBM threats."

One goal of the French ATBM is to provide site protection for France's nuclear deterrent force to ensure continued credibility in face of increased accuracy of Soviet missile systems.

A growing concern for France is the possibility that accuracy improvements developed for Soviet SS-21's, SS-22's, and SS-23's would allow the U.S.S.R. to use these tactical missiles with conventional warheads to pinpoint France's nuclear force and other key military targets without having to make a nuclear first strike, officials said.

"In order to keep our nuclear deterrent force viable, we need to be able to ensure its survivability and its penetration capability," Jean-Charles Poggi, director of the Space and Ballistic Systems Div., said "An ATBM system would be one key element in enhancing the force's survivability."

COMPLEMENTARY FORCE

French officials said the ATBM system would complement other improvements made in the French nuclear force, including the hardening of the country's land-based S-3 nuclear missiles, and the warhead/penetration aid improvement developed for its new M-4 submarine-launched ballistic missiles. Aerospatiale hopes to receive government approval for startup of the new-generation SX mobile ballistic nuclear missile program that has been delayed by national funding constraints.

Parallel to the ATBM studies, Aerospatiale is continuing its contacts with the U.S. military, not only to apprise defense officials of the French company's efforts, but also to keep open the possibility of Aerospatiale participation in U.S. SDI programs.

A new series of meetings have been arranged between Aerospatiale personnel and representatives of the Pentagon, the SDI program and the U.S. Army.

The French administration of Socialist President Francois Mitterrand has been reserved on SDI, and has yet to sign a government-level SDI participation agreement as have Britain and West Germany. (AW&ST Mar. 31, p. 31; Feb. 24, p. 31).

Martre said Aerospatiale is not against participating in SDI, but European defense efforts have to come before a company role in the U.S. program.

"We are evolving our ideas on what could be developed for the defense of Europe. We also are keeping the options open for what eventually could be contracted to us by the Pentagon in the framework of SDI," Martre said.

"Our European defense efforts and the U.S. SDI program are to be complementary and I expect there will be coordination between the two," he added.

COMPANY EXPERIENCE

Aerospatiale officials said the company could offer the U.S. SDI program its experience gained in developing France's nuclear and nonnuclear strategic and tactical weapons systems, as well as its knowledge in materials and system architecture.

"Aerospatiale has one of the most experienced engineering groups in the field of nuclear strategic, tactical and space systems of any country in the free world outside of the U.S.," one company manager said.

Aerospatiale has experience in the use of advanced materials for aerospace applications, company officials said. They pointed out that the Salt Lake City-based Hercules, Inc., signed a license agreement in 1984 for acquisition of an automatic three-dimensional weaving process for production of composite material structures. The system can be used to produce composite rocket motor cases.

Senator QUAYLE. I ask General Abrahamson or Dr. Ikle, have you seen this article and, if so, General Abrahamson, are the French ahead of us on ATBM and if so, how are we going to work this problem?

General ABRAHAMSON. In our discussions on the state of technology with some of our allies, it is quite clear that there are several different kinds of systems that are potential candidates for improved theater-range and short-range ballistic missile problems. The French missiles are good candidates.

The Israelis have a candidate missile as well. The United States has done fundamental technology work in terms of a missile, not an operational missile, but a technology kind of program. There are smaller options in the United Kingdom.

I have seen some defense concepts that are very advanced and quite different in missiles. So, I guess I would say that there is a very active interest across a large number of companies and countries and I am very encouraged about that, sir.

Senator QUAYLE. What do we have that we could deploy in the near term that would be a defensive response to these missiles which apparently the French are working on? What do we have?

General ABRAHAMSON. The near-term deployment is what the Army has already developed quite separate from the SDI program. We would like to answer that for the record.

I think the important thing is that it is a self-defense and a terminal type of system. So, it defends a very small area. It is not a layered defense concept which is quite fundamental to the theory of the SDI and I think in the end will be fundamental to the theory of a short-range ballistic missile threat not only in Europe, but in other theaters as well.

[The information follows:]

General **Harrison**. The Patriot ATM program will develop a capability to intercept and destroy the [deleted] tactical missiles in their terminal flight phase. The program will initially develop software changes that will enable the Patriot system to acquire, track, and intercept the [deleted]. The next step calls for the development of additional software modifications, and Patriot missile warhead and fuze modifications that will enable the system to [deleted]. Each of these modifications improves Patriot's capability against tactical missiles, but the [deleted] Patriot improvements will [deleted].

Senator **Quayle**. As has been pointed out, we have a lot of work to do in this defense area. It is a very important area as these hearings have brought out. Just from the gist of what I am gathering today as far as our near-term deployment.

I presume we will get that requirement to show it is a serious threat to us as well as NATO. NATO certainly sees it. If NATO sees it, I presume we will see it, too. Maybe we have not gotten that far in our work to identify it. I know there has been controversy on who is going to provide air defense. I think we have that pretty well resolved.

I hope it is resolved. We really have to get on with this. People today are searching for what we can do to be helpful to see that this endeavor continues.

As I said in my opening statement, it is my intention to try to offer an amendment that will set aside some money within SDI for the ATBM and particularly in cooperation with our NATO allies on specific measures that we can in fact work on.

I think we get that from the Senators' questions from Senator Wilson and Senator Thurmond and others, that we do not want to duplicate effort. We want ATBM development to be as efficient as possible. If we set aside some money on a cooperative basis, maybe a matching type of approach, we can pick and choose what technology we see that would be helpful.

I do not see anything currently that we can really focus on. I am interested in the general comments about the approach we ought to take just to show Congress' interest in this area to set aside some money for some cooperative effort.

Senator **Warner**. Why take it out of SDI? Why not take the money from somewhere, put in money and start de nuovo?

Senator **Quayle**. It comes out where the money will be. We have to get it somewhere and take it from somewhere else.

Senator **Warner**. Your current observation is important. I am concerned that if you put another tasking on SDI right now, it will weigh it down. A lot of the systems are interchangeable. On the terminal phase systems it seems to me we could shift the software.

Senator **Quayle**. I know SDI has a keen interest in what goes on because they are the ones that will gain information from this technology. They are the ones that are closely associated with it.

I do not know whether the Army ought to be more involved or how we want to get into that debate.

First of all, I want to know, generally speaking, is it a good idea for us to set some money aside specifically for this function on

ATBM and particularly a flexible cooperative arrangement we might have?

Mr. **Ikle**. This idea commends itself very much to go this route, as you know, and you have done a great deal in initiating this. We have now shown real success in other areas in conventional improvement by a cooperative approach with the allies and extend that particularly in a way that Senator Warner suggests might be done with additional resources to the overall SDI effort.

I think that would be very timely now in that it would help us to use the approach we have used with the allies on air defense, the approach we are now using on advanced conventional improvements outside of the missile air defense and would get us into a mode of sharing and matching moneys and foraging a common program which has the kind of focus that Senator Warner pointed out earlier, we have to generate now.

I would propose—General Abrahamson ought to comment on this further—I would propose that we get back to you with some more specific ideas about how this might be done.

Senator **Quayle**. Generally speaking, you are favorably disposed to try to get some congressional involvement and interest in this and allocate specific money for an ATBM-type role?

Mr. **Ikle**. I think the time is right for it.

General **Abrahamson**. I fully agree.

Senator **Quayle**. I think it is important and it is something I intend to pursue.

Let me also just leave with this and impress upon you, hopefully, the urgency we might be able to get that ATBM report back. I think it is helpful if we can have that. We put it in last year's authorization. It is still pending. I add my voice to getting that so that we can make sure we march forward in an efficient manner.

General **Wall**. Sir, the ATBM is a subset of a larger extended air defense sort of thing to include many other things. We need to look at the entire extended air defense role to include threats such as cruise missiles.

In terms of perhaps "where is the beef kind of stuff," there are other countermeasures, such as standoff target acquisition, ATCM's and these sorts of things that have to be cranked in. So, it is a big area.

In terms of research, in a requirement sense, requirement with a big R, there are many tactical things that are around that could be used. The Patriot and Hawk and F-15's, look-down/shoot-down, these sorts of things. But there is not an integrated system yet. This would have to be preceded by some research looking at the capabilities, the future technologies and combining these in an integrated sense.

That is where this big R requirement is going to come out as we piece these things together in an integrated fashion.

Senator **Quayle**. I know that there are other requirements and interests, but let us not lose focus on this new introduction by the Soviet Union of these highly accurate and capable weapons, particularly the 22's and 23's that have a long-range capability. The 21's are there.

It is a new introduction and it tips the balance of power dramatically. I think we have to come up with something.

Also, as I mentioned earlier, we have a CRS study that has just come out that details significant proliferation of ballistic missiles around the world. It is not just the Soviet Union. We have to focus on the ballistic missile threat that we have and be able to come up with some sort of response.

I think that Aviation Week article certainly showed the French understands it fully well. Our NATO allies are concerned about it. We ought to take a lead on this, particularly with the proliferation we have around the world.

Senator WARNER. Mr. Exon.

Senator EXON. Thank you, Mr. Chairman.

Welcome, gentlemen. I have just two questions. I will be brief.

Senator WARNER. You do not have to be brief.

Senator EXON. Dr. Ikle, the majority of the European public seems to favor strongly an ABM Treaty, but they have not been strongly supportive of SDI today.

How, do you view, and what are our problems with, the development of the ATBM system without running into a similar public outburst in Europe as we initially ran into with the Pershing and cruise missile deployment?

There are some potential problems, are there not?

Mr. IKLE. We continuously face the problem that opponents of NATO defenses will be mobilized by Soviet propaganda to oppose any defenses, whether it is chemical defensive weapons by the United States, conventional GLCM's and Pershing's in response to the SS-20 or SDI.

The general European public's view about the ABM Treaty to some extent may not have fully caught up with the implications of future technology and the fact of Soviet treaty violations.

It is very understandable that in Europe, and for that matter in this country, people would favor an era of stability such as was promised with the ABM Treaty and the SALT Treaty in 1972. But we have now begun to recognize that the promise was not realized.

I think this opinion is gaining ground in Europe, too. There is no question that the Europeans support air defense. As Minister Wörner explained, antitactical ballistic missile defense grows organically out of our effort and the European effort to provide for effective air defense.

Senator EXON. The answer to my question is that we face the usual problem with certain elements of the European society that you think can be overcome without any major problem? Is that what you are telling us?

Mr. IKLE. I would say it is almost overcome because there are these European-originated initiatives in addressing the very threat that NATO conventional defense faces from these short-range potential conventionally armed Soviet missiles.

Senator Quayle referred to the French interest. We know through prior extensive discussions with other allies, the Defense Ministry's Department of Defense expressed their concern about the threat, and their determination to find ways to cope with it.

Senator EXON. Thank you.

General Abrahamson, I welcome you and have one question for you.

How does the theater ATBM problem compare to that of the strategic defense of the United States?

There are some similarities and some differences. I assume there are some difficulties caused by the shorter geographical distances and reaction time available in Europe.

Could you briefly outline some of the major problems, if any, and what you think the chances are for fitting this in with the program you head up?

General ABRAHAMSON. I would like to divide the answer in three separate parts.

The theater threat is obviously one and we have been speaking this morning about the ever-increasing importance and accuracy of the shorter range ballistic missile threat. So, that is one category.

There certainly is the category of the air-breathing threats and that is a growing and equally grave concern in terms of cruise missiles and the increased capability of the size of the manned Soviet Air Force and East European Air Force, and, frankly, in other theaters you have a similar situation.

Finally, there is this category of very, very short-range tactical missiles that may be utilized from aircraft, again with effective capability against ground targets.

So, there is the whole range and each one of these can be armed with conventional weapons, nuclear weapons, or with chemical weapons. So, they fall in all those categories.

I believe that in the end we must have a layered defense concept to deal with this. In that sense, we are talking about the same basic theory that we are applying for SDI in order to achieve the kind of stability and levels of effectiveness that we are talking about for intercontinental range ballistic missiles as well.

That means that many of the requirements such as early surveillance, instantaneous command and control and communications across a very broad front, those kinds of things are common technologies and they can be applied.

In terms of the weapons, some of the weapons can be applied. In other cases, they are quite different. Just as the Patriot upgrade is a very different weapon with a particular characteristic or short-range missiles may be effective.

In some cases our rail guns are very applicable and could be applied operating at much lower speeds than we must accelerate them in space. We have seen specific concepts from both United States companies and from European companies that have been given to us in this area.

The Israelis, who face an absolutely crucial threat in the Middle Eastern theater, are not waiting for some of our participative programs. In my recent trip to Israel, I saw where they were putting together an electrothermal gun that can be very effective against very short-range threats that they may have to deal with.

There are similarities and differences. In each case in each of the categories, that is why we are giving rather complex answers to these questions. I believe what it underscores is that there are opportunities in the operational programs that are underway today in all three services to improve and to make incremental differences against these threats.

There are real opportunities in applying some of the SDI technologies and concept to make very large quantitative improvements and they do not have to be so far away.

Third, by applying some of the spinoff of these technologies against the air-breathing threats, I think we can improve that concept as well.

Now is the fundamental task more difficult? In the case of the SS-21 or missiles like that where we are talking about very short time of flight, it is difficult to build a layered defense with as many layers as one would like.

On the other hand, you do not have the problem of reaching thousands of kilometers across the curve of the Earth either. So, I think there are offsetting simplifications.

If I added up all of those, I think it is probably as easy applying advanced technologies to solve the short-range problem, and, in fact, it may be easier than it is to solve the very long-range problems. But we have to do it smartly and we have to apply our most advanced technologies in order to find these solutions.

Senator **Exon**. General, thank you very much.

I have no further questions, Mr. Chairman.

Senator **Warner**. Thank you.

Dr. Ikle, let us go to page 4 of your testimony. Under developmental testing and deployment of defense systems against the tactical ballistic missile submitted by the Chiefs, so long as these systems do not include interceptor missiles, given the capability to counter strategic ballistic missile element flight objective, I am trying to search back in my memory whether or not that "so long" clause you have in there should not refer to testing as opposed to the inclusion of the component such as interceptor missile launchers and radars.

For example, I am reading from subsection 2:

> Interceptor missiles flight tested against a target vehicle has a flight trajectory with characteristics of the strategic ballistic missile flight objective or is flight tested in conjunction with the test of ABM interceptor missile.

And so forth.

Will you take a look at that?

Mr. **Ikle**. I think for a definitive statement we should use the actual treaty language, of course. There are various articles that have to be woven together here so as to be very careful not to inadvertently improvise some new interpretation that is inappropriate.

We have, first of all, the definition—I do not know how much you want to go into this. Maybe the short answer that you want is that the authoritative language, obviously, is treaty language and agreed understandings are not prepared for all delivery of testimony I gave this morning.

I wanted to convey a sense of what the treaty touches on. I was not trying to give a correct legal version of the language that was agreed to.

Senator **Warner**. Anyway, take a look at it. It should be revised in some way.

Mr. **Ikle**. It could lead to a misinterpretation. We will send a corrected statement on that. If article 2 was the definition that is relevant, then articles 6——

Senator **Warner**. You are the expert. I just bring it to your attention.

General Wall, will the Army be doing the architectural study this year to support a vigorous development program in fiscal year 1987?

General **Wall**. The SDI will be doing those studies. I will be executing them for SDI.

Senator **Warner**. You will be the agent for SDI?

General **Wall**. Yes, sir.

Senator **Warner**. Dr. Ikle, what types of targets should be defended and what level of effectiveness should we initially seek to defend them in the European missile defense?

Mr. **Ikle**. Initially the targets we want to defend are the high value military assets of the Alliance or the specific allies that permit them to maintain a credible conventional defense. That is to say to make it impossible or very uncertain for Soviet planners to eliminate the defense in sort of what would be a 1990 version of an attack against military assets.

I could be specific here. Command, control, and communication centers, air defense assets on the ground, parked aircraft, headquarters.

Senator **Warner**. In your earlier observations of a general nature on various arms control agreements you now have and what we are going to try to achieve in the future, I wonder if you might add your own views about the need to include in any future treaty a provision for enforceability of the treaty?

How do we propose to do that.

Mr. **Ikle**. We very much have to have in mind the problem of reacting to Soviet violations and that only becomes a political problem that the treaty has to be so that the violation is convincing, that we can get the evidence and, therefore, we can marshal the political support here in town to what may be a painful, already perceived, even a dangerous step to take to penalize for the reaction.

Senator **Warner**. Thank you, Doctor.

Senator Quayle, do you have anything further?

Senator **Quayle**. No. Thank you very much.

Senator **Warner**. We have covered this rather fully in open session. It has been my desire in the subcommittee this year to get more and more of our testimony in open session. I think we have achieved that, gentlemen.

I thank you for your support in that area. I at this time do not know of any need to go into a closed session. Do the witnesses feel that there is classified testimony relative to this issue that we should have?

Mr. **Ikle**. I think if we do find something, we could submit it on a classified basis, if General Abrahamson agrees.

[Insert submitted by Senator Dan Quayle. Full text of the study is retained in committee files.]

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

BALLISTIC MISSILE PROLIFERATION POTENTIAL IN THE THIRD WORLD

EXECUTIVE SUMMARY

The proliferation of ballistic missiles* in the Third World has begun, and looms on the horizon as a growing concern. Both the Soviet Union and the United States have provided short range ballistic missiles to countries in the Middle East. But the ability to indigenously produce such systems (spurred by fledgling space programs and the general advance of technology) is rapidly spreading throughout the Third World, raising the possibility that substantial numbers could be deployed in most regions of the world in the not too distant future. Countries such as India and Brazil, which plan to have fairly capable satellite launch vehicles around 1990, would then possess a capability to deliver weapons payloads to most significant targets in neighboring countries. The countries of concern are for the most part in areas of the world where the United States has security interests--many are what might be termed "hot spots." As well, many are on the list of potential nuclear proliferators.

Ballistic missiles give a country the ability to penetrate another's defense system and attack deep targets. Some countries are on the verge of achieving high accuracy and large warheads with great destructive force, which would afford an ability to eliminate preemptively key military forces of an opponent. This new-found capability can alter a regional balance of power. In the hands of a peaceful state, ballistic missiles could help deter aggression. In the hands of an aggressor, they could facilitate international blackmail or conquest.

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* As used in this paper, the term ballistic missile refers to a missile which is self-propelled and guided, with a range of many kilometers. Ballistic missiles carry their own fuel and oxidizer propellants (as opposed to aircraft and cruise missiles which must stay in the atmosphere and get their oxidizer--oxygen--from it.) Ballistic missiles also do not generally need aerodynamic control surfaces.

The factors that lead to ballistic missile proliferation can be grouped into two broad categories. One is the fledgling space programs of countries like India and Brazil. India has successfully orbited satellites with an indigenously-developed launch vehicle, and Brazil will probably do so in a few years. Except for warhead and reentry vehicle technology, the development of a space launch vehicle (SLV) provides an inherent capability to build ballistic missiles. Indeed, the sounding rockets** which often serve as stepping stones SLV development offer a limited ballistic missile capability. (It is important to bear in mind that possessing a capability does not imply an intent). Often, these fledgling space programs have benefitted from extensive cooperative ventures with developed, space-faring countries in scientific space research, ventures dating back to the dawn of the space age. Most of the technologies involved are prime examples of dual-use technologies, that is, technologies which have both civilian and military applications.

The second causal factor is direct--the dedicated military missile programs of such countries as Israel, South Korea, and Taiwan, coupled with the export of short range ballistic missiles by the Soviet Union to such countries as Egypt, Iraq, Libya, Syria, and North Korea. The dedicated programs of

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**Sounding rockets are generally small rockets which are launched vertically (i.e., straight up) and make atmospheric measurements. The payload is thus one or more scientific sensors.

Israel, South Korea, and Taiwan to develop indigenous missiles derive primarily from their attempts to upgrade and modify less capable systems provided by the United States. It seems doubtful that the Soviet clients have the technological capability to do the same anytime soon. However, whether the systems come from the West or the East (and others, such as France and China, are involved besides the United States and the Soviet Union), the export of sophisticated weapons not only expands military threat levels but often has a stimulating effect on the scientific and technical community of the recipient countries. Several of these countries also cooperate with each other in relevant technological areas.

U.S. Armed Forces and those of our allies will in the future be confronted by hostile military forces increasingly armed with ballistic missiles. The inexorable advance of technology in the world argues that it will be impossible to prevent more countries from developing a ballistic missile delivery capability, although in many cases that capability will be crude by U.S. standards. (The proliferation of countries who can manufacture aircraft is an indicative case study.) However, some key technologies are needed, especially guidance and control technology for accurate delivery, especially for conventional warheads for use against point targets. If a country chooses to go the nuclear route, nuclear materials and fabrication techniques would be required. Controlling the key technology exports, traditional diplomatic measures, and developing defensive systems are possible means to moderate this new threat.

The following table summarizes the current ballistic missile situation in the Third World.

BALLISTIC MISSILE POTENTIAL IN THE THIRD WORLD

Country	Potential Launch Vehicle/Missile	Comment
Civilian Space Programs		
India	SLV-3 operational; ASLV, PSLV & GSLV planned	SLV-3 has 40 kg payload
Brazil	Sonda IV operational; VLS planned	Sonda IV has 500 kg payload
Pakistan	None, but some report plans to develop an SLV	
Argentina	Condor under development	400-kg payload to 100 km
Military Missile Programs		
Israel	Jericho, Jericho II	Indigenous development
South Korea	"Korean SSM" & Honest John from U.S.	"Korean SSM" apparent adaptation of U.S. Nike-Hercules
Taiwan	Ching Feng (Green Bee) & Honest John from U.S.	Green Bee similar to Lance
Syria	SCUD-B, FROG-7, SS-21 from U.S.S.R.	
Egypt	SCUD-B, FROG-7 from U.S.S.R.	
Iraq	SCUD-B, FROG-7, SS-21 from U.S.S.R.	
Libya	SCUD-B, FROG 7 from U.S.S.R.	
North Korea	FROG-7 from U.S.S.R.	

Senator **Warner**. Thank you very much, gentlemen.

[Whereupon, at 10:43 a.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 1987

TUESDAY, MAY 6, 1986

U.S. SENATE,
SUBCOMMITTEE ON PREPAREDNESS,
COMMITTEE ON ARMED SERVICES,
Washington, DC.

NATIONAL STOCKPILE, NAVAL PETROLEUM RESERVE

The subcommittee met in open session, pursuant to notice, at 10:05 a.m., in room SR-222, Russell Senate Office Building, Senator Gordon J. Humphrey (chairman) presiding.

Present: Senators Humphrey, Goldwater, and Dixon.

Staff present: Patrick A. Tucker, general counsel; Patricia L. Watson, Ronald P. Kelly, and David S. Lyles, professional staff members; Inga B. Schoonover and Richelle M. Turner, staff assistants.

Also present: Gerald J. Smith, assistant to Senator Goldwater; John L. Roddy, assistant to Senator East; Allan W. Cameron, assistant to Senator Denton; Alan Ptak, assistant to Senator Gramm; Thomas K. Longstreth, assistant to Senator Kennedy; Charles C. Smith, assistant to Senator Dixon; and Milton D. Beach, assistant to Senator Glenn.

OPENING STATEMENT BY SENATOR GORDON J. HUMPHREY, CHAIRMAN

Senator **HUMPHREY**. Good morning.

The Preparedness Subcommittee meets today to examine the national strategic stockpile and the naval petroleum reserve.

Our witnesses this morning are Hon. James A. McClure, U.S. Senate, Hon. Charles E. Bennett, U.S. House of Representatives, Bernard A. Maguire, Associate Director, National Preparedness, Federal Emergency Mangement Agency, and many, many assistants.

I would like to enter Senator Dixon's opening statement into the record at this point.

[The opening statement of Senator Dixon follows:]

OPENING STATEMENT OF SENATOR DIXON

Mr. Chairman, I am glad that you have called this hearing to discuss the National Defense Stockpile and the Naval Petroleum Reserve. There are some critical questions we must address in both of these areas.

On the subject of the National Defense Stockpile, we need to address the issue of whether we should accept the recent executive branch study that significantly lowers the current inventory goals for critical materials in the stockpile, or whether we should continue to build the current stockpile.

On the subject of the Naval Petroleum Reserve, the President's fiscal year 1987 budget calls for the sale of these oil reserves. The fiscal year 1987 Budget Resolution reported by the Senate Budget Committee includes reconciliation instructions that would require this committee to authorize the sale of these reserves during fiscal year 1988. We have to ask whether these oil reserves, which have been in the hands of the U.S. Government since the beginning of this century, really represent a national security asset or whether they can be sold off to reduce the deficit.

Mr. Chairman, I will have questions for the witnesses after their prepared statement.

Senator HUMPHREY. I see Senator McClure coming in. I will let you decide who is first.

Senator McCLURE. Let Mr. Bennett go first.

STATEMENT OF HON. CHARLES E. BENNETT, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. BENNETT. Thank you, Senator Humphrey, for this opportunity to appear before your Subcommittee on Preparedness to express my views on the national defense stockpile.

The purpose of the national defense stockpile is to provide sufficient quantities of strategic and critical materials to sustain the United States for a period of not less than 3 years in the event of a national emergency.

The intention of Congress in enacting the Strategic and Critical Stockpiling Act of 1979 was to establish a logical business-like procedure for managing the stockpile by depositing proceeds from the sale of excess or unneeded stockpile material into the national defense stockpile transaction fund, there to be used for the purchase of other strategic and critical materials to meet approved stockpile requirements.

The transaction fund was established specifically to prevent the practice of transferring the receipts of stockpile sales directly to the general fund of the Treasury, instead of using the funds for the purchase of strategic materials for the stockpile.

I was encouraged when President Reagan initiated the first stockpile purchase in some 20 years from funds available in the national defense stockpile transaction fund. Since 1981 the administration has purchased $367.5 million of stockpile material, including $137 million of bauxite, $119 million of cobalt, $29 million of titanium, $28 million of beryllium and $24 million of nickel.

During this same period the administration sold approximately $437 million of excess stockpile material which included $200 million of tin, $86 million of diamonds, $78 million of tungsten and $18 million of silver which provided funds for the purchase of more urgently needed materials.

However, the President's fiscal year 1987 annual materials plan proposes to dispose of $250 million of stockpile materials including some of the same material purchased by the administration and other material such as chromium, manganese, and platinum.

The budget also proposes significant cuts in the national defense stockpile by proposing the capital transfer of $870 million from the national defense stockpile transaction fund to the general fund of the Treasury.

The administration's legislative proposal to implement their budget plan would authorize the disposal of $366 million of stockpile material and authorize the discretionary transfer of funds in the national defense stockpile transaction fund to the general fund of the Treasury.

These proposals are clearly contrary to the intent of the 1979 Stockpiling Act.

The National Security Council has recommended that stockpile goals be reduced from $16 billion, as recommended by President Ford and President Carter, to a meager $700 million. One might ask whether there has been some radical change in our import dependence on critical materials since President Reagan warned of our insecure mineral situation in his April 5, 1985 report, "National Materials and Minerals Program Plan and Report to Congress," or whether our sources of supply are more secure now than in 1982?

We are still highly dependent upon foreign sources of supply and, in my opinion, southern Africa, in particular, is decidedly less secure. We need to ask: Why does the National Security Council believe that our current stockpile goal of approximately $16 billion can be reduced to $700 million? Would a drastically smaller stockpile still meet the massive requirements for materials that would be needed in any future emergency?

Common sense leads me to believe that a smaller stockpile cannot meet national security requirements. At my request, the General Accounting Office is currently conducting an indepth review of the National Security Council stockpile study. Unfortunately, GAO is having difficulty in obtaining the cooperation of Federal agencies involved in the study.

The President's stockpile proposal has been received with skepticism from the Congress reflecting a serious concern about the appropriate size of the national defense stockpile to meet U.S. defense mobilization requirements.

Debate about the size of the stockpile is not new, nor are the issues involved in determining stockpile requirements. This debate has continued periodically during the past four decades. It is important to note that the most significant changes in stockpile goals in the past have resulted from changes in policymakers' stated perceptions about the strategic threat to the national security—the location, duration, and intensity of the possible national emergency. They really have not had much to do with the quantities of materials per se.

In this regard, the administration's stockpile plans appear to be inconsistent with our declared military doctrine—military forces capable of fighting across the entire spectrum of potential conflict. That spectrum includes lengthy conventional warfare, as well as possible escalation to nuclear war. If we cannot sustain conventional conflict, a nuclear war becomes more likely—a war that no one can win.

The Defense Secretary's fiscal year 1986 report notes:

> Because of the enormous military strength of the U.S.S.R., the United States cannot prepare only for a "short war," which would merely tempt an adversary to believe he could outlast us in combat.

In essense, we should not pursue a short-term strategy against a long-term foe. An adequate stockpile bolsters our ability to sustain conventional conflicts. Improved conventional capability raises the nuclear threshold, and enhances deterrence.

Therefore, on November 13, 1986, I introduced H.R. 3743 which has been cosponsored by the entire membership of the Subcommittee on Seapower and Strategic and Critical Materials. H.R. 3743, among other things, provides that:

One. Stockpile goals should be determined by law rather than by administrative action.

Two. Management of the stockpile would be delegated to the Secretary of Defense.

Three. Appropriations for the operations and content of the national defense stockpile and appropriations from the national defense stockpile transaction fund would be made to the Department of Defense.

Our subcommittee held hearings on February 27, 1986, on the President's proposed stockpile policy, and on H.R. 3743. As a result of Senator McClure's testimony, the subcommittee agreed to work with Senator McClure to incorporate the concepts contained in his bill, S. 2102, into our legislation.

Consequently, we have developed a substitute bill which I plan to offer to my subcommittee to incorporate in the fiscal year 1987 Defense Authorization Act. I would like to offer the text of our substitute bill to be included in your hearing record and for your subcommittee's consideration.

I believe that the enactment of this legislation can provide the necessary "will" to begin a prudent restructuring of the national defense stockpile to provide the most critical materials in their most usable form in the event of a national emergency.

Short of automatically establishing by law stockpile goals resulting from the McClure formula, I intend to work with Senator McClure in the future to strengthen the concepts of determining these goals.

We must bring out into the open, but not to the extent to jeopardize national security, the processes for establishing goals for the stockpile. Congress now authorizes the number and kinds of airplanes, tanks, artillery tubes, and warships.

Why should Congress not authorize the quantities and forms of basic strategic and critical materials needed by our industry to support our conventional fighting forces? Why should not the national defense stockpile program be managed in a business-like manner by the Department of Defense in support of national security, rather than the present ineffective committee management system?

As chairman of the Seapower, Strategic and Critical Materials Subcommittee, I have been working on the national defense stockpile for many years and have come to the conclusion that the only way to bring stability to the program is to include the Congress in the development of stockpile policy in the same manner it is now involved in the determination of national defense policy.

Thank you, Senator Humphrey, for the opportunity to express my views on the national defense stockpile. I hope your committee will join Senator McClure and me in attempting to bring stability and common sense to this important national security program.

Senator **Humphrey**. Thank you, Congressman Bennett. Senator McClure.

STATEMENT OF HON. JAMES A. McCLURE, U.S. SENATOR FROM THE STATE OF IDAHO

Senator **McClure**. Thank you very much, Mr. Chairman.

First, let me ask unanimous consent that my prepared statement, together with the attachments, be made a part of the record.

Senator **Humphrey**. Fine.

Senator **McClure**. I will not take the time to read it. Much of it would be repetitious of what Congressman Bennett has said. I support everything he has said.

As he has indicated in his statement, we have been able to merge his proposal and mine into one bill which we will submit and is a part of the testimony today.

Mr. Chairman, I hope it is not necessary and I believe it is not with you and with Senator Goldwater, chairman of the full committee, to establish the fact that the current system has not worked. I know that you can criticize any individual suggestion that may be made suggesting that it is not in itself perfect, but the track record over the years that we have had the current system proves that it does not work and we have to try some different approach.

The administration will criticize the formula approach I have made and they have done so by a letter addressed to the chairman of the full committee saying that the formula that I have suggested is wrong because it deals with peacetime consumption and production, not wartime consumption and production.

But you tell me how you can go from a lead goal of 1,100,000 short tons to zero and back again to 1,100,000 tons as a stockpile goal and say that is better. Mine may not be perfectly related to the needs of a wartime economy, but it is a whale of a lot closer to the wartime needs than is the current manipulation of stockpile goals.

Congressman Bennett has insisted that it is a political decision and I think the substitution of a political decision by the Congress rather than by the administration is certainly a superior, although it is itself not a perfect system. I fully support that.

I hope we can be guided by a formula that removes it from the kinds of manipulation that we have seen by various administrations in the past, including this one.

I would urge you, sincerely and emphatically, to take a careful look at the formula approach as a recommendation with congressional determination as improvement over the current condition and I believe the best suggestion now pending before the Congress.

I will be pleased to respond to any questions you may have.

[The prepared statement and attachments of Senator McClure follow:]

PREPARED STATEMENT OF SENATOR JAMES A. MCCLURE, CHAIRMAN, ENERGY AND NATIONAL RESOURCES COMMITTEE, U.S. SENATE

Mr. Chairman and Members of the Subcommittee: It is a pleasure for me to testify before the Subcommittee today alongside my friend and colleague, Congressman Bennett, on stockpile policy in general and, more specifically, the President's July 8th National Defense Stockpile "Modernization" proposal. In addition, Mr. Chairman, I would like to offer a legislative proposal (attached hereto) that Congressman Bennett and I have formulated for the consideration of this Subcommittee as well as the Seapower and Strategic and Critical Materials Subcommittee chaired by Mr. Bennett in the House.

Before addressing the specifics of our proposal, I would like to make a few observations regarding the National Defense Stockpile.

Mr. Chairman, the rationale for establishing a National Defense Stockpile is as valid today as it was in 1939 when it was established by Congress. However, the history of the stockpile since that time is replete with examples of manipulation by previous Administrations for a variety of reasons (e.g. partisan politics, supporting foreign policy objectives, stabilizing prices, reducing deficits, fighting inflation, etc.) unrelated to the stated purpose of the 1939 Act.

That purpose has been restated as recently as the "Strategic and Critical Materials Stockpiling Revision Act of 1979", as amended. Yet, we find that the acquisition of stocks of strategic and critical materials for the National Defense Stockpile has, over the past four decades, fluctuated like a roller coaster. Have these fluctuations resulted from advancing defense technologies or changing patterns in domestic consumption or even geopolitical consequences of instability in such areas as South Africa, Angola, Zaire, Zimbabwe, and so forth? Perhaps in part, but most of these fluctuations have been generated for purely economic and budgetary reasons. If I am wrong, then I would like for someone to explain to me why, for example, we had an established stockpile goal for lead in November of 1944 of 1,100,000 short tons but in June of 1963 that goal was zeroed-out and in May of 1980 the goal was reestablished at 1,100,000 short tons. The mineral zinc was likewise affected in the same time frame.

While there are numerous examples of other stockpile commodities whose goals have fluctuated over this time period as well, suffice it to say, I hope I have made my point.

Mr. Chairman, there is yet another observation I would like to make regarding efforts to manipulate the stockpile. There is a disturbing similarity with respect to actions being proposed by this Administration and those proposed by the Nixon Administration. As you may recall, President Nixon announced in a press release in April of 1973 that the one weapon that he had not used in the "fight against rising prices" was the strategic stockpile. He further stated that while the then existing stockpile would be substantially reduced (i.e. from a three-year war scenario to a one-year war scenario), it would continue to contain "critical materials that we need in quantities fully adequate for our national security requirements." Under President Nixon's proposal, changes in stockpile objectives would result in reducing the stockpile from a value of $4.8 billion to $700 million. Also, the General Accounting Office (GAO) in its report to Congress on March 11, 1975 said, with respect to President Nixon's assumptions: "We could not obtain definitive explanations as to how and why those more optimistic assumptions came to be other than the National Security Council directs them." Finally, Mr. Chairman, GAO suggested that "until the Nation's critical resource requriements are clarified, the Congress may wish to consider halting future disposals currently authorized under specific legislation and grant no further requests to dispose of strategic and critical materials." While the GAO has not completed its review of the President's July 8th proposal as requested by Congressman Bennett and myself, Mr. Chairman, the suggestion GAO made in 1975 has already been accomplished by my amendment to the FY-85 Supplemental Appropriations Act and Congressman Bennett's amendment to the FY-86 Defense Authorization Act. Based upon recent feedback from GAO, I would not be a bit surprised if we hear the same statement in 1986 that they made in 1975. If that turns out to be the case, then our amendments were indeed timely and necessary.

Mr. Chairman, I believe that something must be done to prevent the "bean counters" in the Office of Management and Budget (OMB), no matter what political party is in the White House, from using the National Defense Stockpile as a budget tool for purposes other than national defense. Thanks to the legislative efforts of those like Congressman Bennett over the years, many of the loopholes in the stockpile statute have been closed. Our proposal attempts to tighten the statute even further by placing Congress in the role of determining the quality, for the National

Defense Stockpile and by requiring the President's stockpile functions, currently contained in sections 5, 6, 10, and 11 of the Strategic and Critical Materials Stock Piling Act of 1979, be transferred to the Secretary of Defense.

As you know Mr. Chairman, I have introduced legislation over the past several years in an attempt to bring stability to our past chaotic stockpile policies by providing an objective method for determining stockpile goals. I have reintroduced that legislation this year. The legislative proposal attached to my statement incorporates the concepts contained in my bill, S. 2102, and Congressman Bennett's bill, H.R. 3743. While the provisions contained in our legislative proposal regarding my formula does not go as far as the provisions in my bill S. 2102, I hope to work with Congressman Bennett in strengthening these provisions in the future. Notwithstanding this, I solicit your support and assistance in achieving the passage of our proposal. With your indulgence Mr. Chairman, I would like to briefly describe the major provisions of our legislative proposal.

First, our proposal prescribes a new method for determining the quantity of any material to be stockpiled under the Strategic and Critical Materials Stock Piling Act. As evidenced by the President's July 8th Nation Defense Stockpile "Modernization" proposal, we have not solved the problem of violent fluctuations in stockpile goals. Clearly there has been no simple formula used for determining stockpile goals and certainly no consistency. Our proposal will bring us one step closer to a more simplistic and consistent method for determining stockpile goals by having the Congress make such determinations. Our proposal provides that the Secretary of Defense should assist Congress by continuing to designate the materials that are needed for the stockpile. But, the proposal recognizes that an order of priority exists with respect to the quantity of each material stockpiled and that fundamental to that priority is the dependency and potential vulnerability this Nation has on imports to meet raw material needs.

The United States is obviously most vulnerable to supply difficulties with respect to commodities which it does not produce in any significant quantities. In our proposal, these materials are designated as "Class A." Those commodities which represent materials of which the United States has some production but is unlikely to achieve self-sufficiency, even with severe rationing or substitution are classified as "Class B." Finally, those commodities which the U.S. produces in substantial quantities but for which it has some import dependence are designated as "Class C." The importance of these designations is that the goals would rely on our foreign dependency. For commodities in "Class A", the goal would be equal to a 3-year supply of a 5-year average of net imports for materials for which we import in excess of 65 percent of our needs. For "Class B", the goal would be a 2-year supply of materials for which we import 30 to 65 percent of our needs and for "Class C", the goal would be a 1-year supply of materials for which we import less than 30 percent of our needs.

The executive branch, through the leadership of the Secretary of Defense, would be authorized to designate the classification of individual commodities under the terms of our proposal and in doing so will be expected to calculate average annual U.S. net imports of each. These calculations will be based on the 5 calendar years immediately preceding and such calculations will be made at least once every 5 years.

When stockpile acquisitions are taking place, imports will tend to rise and subsequently, when stockpile liquidations are taking place, imports will tend to fall. Therefore, in calculating net imports, our proposal requires that shipments from government stockpile excesses be added to arrive at figures not influenced by stockpile activities.

The proposal further recognizes that in some special cases the formula outlined may not yield a result in line with the statutory requirement that the stockpile contain sufficient quantities to sustain the U.S. for a period of not less than 3 years in the event of a national emergency. Our proposal does not change the not less than 3 year requirement in event of a national emergency. There is a provision in our proposal which allows the Secretary of Defense working with other agencies of the Executive Branch to propose a different goal. However, those involved in proposing a different goal must come to Congress and explain the proposed departure. Due to the subjective nature of determining the material needs in a national emergency, congressional oversight will help to eliminate the use of the National Defense Stockpile for budgetary purposes.

Mr. Chairman, the following tabulation compares the quantities for certain key materials which are involved in the stockpile program under two alternatives. The first alternative is the program of the Federal Emergency Management Agency [FEMA] in 1984 and the second alternative is embodied in our legislative proposal.

STRATEGIC STOCKPILE—PRESENT STOCKPILE GOALS, HOLDINGS, AND McCLURE/BENNETT FORMULA REQUIREMENTS

[Figures in thousands]

Commodity	Class	1984 FEMA goal	October 1984 holdings	Proposed requirements	Deficiency or surplus
Aluminum (short tons)	C	7,150	4,279	367	+3,192
Antimony (short tons)	B	36	38	34	+4
Cobalt (pounds)	A	85,400	46,194	51,102	−4,908
Copper (metric tons)	C	1,000	29	203	−174
Lead (short tons)	C	1,100	601	73	+528
Nickel (short tons)	A	200	32	261	−220
Tin (metric tons)	A	42	186	119	+67

To explain the rights of the Secretary of Defense that I previously mentioned, I would like to concentrate for a moment on the commodity, cobalt. Under the FEMA alternative, the stockpile goal for October 1984 is 85,400,000 pounds. Under our alternative, the goal or requirement is 51,102,000 pounds. If the Secretary of Defense determines that the 51,102,000 pounds is not a sufficient quantity for the U.S. in a national emergency, he must justify his reasons to Congress. It would be the responsibility of the Secretary of Defense to present his reasons for why the goal derived from the import formula does not yield a proper result. It will then not only be the responsibility of the Congress to review the goal and the Secretary of Defense's reasons for proposing a change, but it will be the Congress which ultimately approves or disapproves such a proposed change and finally the quality and quantity for each material in the stockpile as well.

Mr. Chairman, I believe that the Presidential authorities currently contained in Sections 5, 6, 10, and 11 of the Strategic and Critical Materials Stockpiling Act of 1979 that are transferred to the Secretary of Defense in our proposal will more adequately assure that the determination of which materials are to be acquired for the National Defense Stockpile and the quantities of such materials more accurately reflect national defense needs and not the needs of the Office of Management and Budget to reduce the deficit.

Mr. Chairman, and members of this subcommittee, I want to thank you again for inviting me to appear before you today and I look forward to working with you in the coming weeks in legislating a resolve to this very important matter.

[Discussion draft Apr. 29, 1986]

PROPOSED SUBSTITUTE FOR H.R. 3743/S. 2102

Strike out all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Strategic and Critical Materials Stockpiling Amendments Act of 1986".

SEC. 2. STOCKPILE REQUIREMENTS.

(a) PURPOSE OF STOCKPILE.—Section 2 of the Strategic and Critical Materials Stock Piling Act (50 U.S.C. 98a) is amended by adding at the end the following new subsection:

"(c) It is the intent of Congress—

"(1) that the National Defense Stockpile be used to serve the interest of national defense only and not be used for economic or budgetary purposes; and

"(2) that the quantities of materials stockpiled under this Act should be sufficient to sustain the United States for a period of not less than 3 years in the event of a national emergency.".

(b) ESTABLISHMENT OF STOCKPILE REQUIREMENTS BY LAW.—Section 3 of such Act (50 U.S.C. 98b) is amended to read as follows:

"ESTABLISHMENT BY LAW OF STOCKPILE REQUIREMENTS

"SEC. 3. (a) The materials that are strategic and critical materials for the purposes of this Act, and the quality and quantity of each such material to be acquired for the purposes of this Act and the form in which each such material shall be acquired and stored, shall be established by law.

"(b) Such materials when acquired, together with the other materials described in section 4, shall constitute and be collectively known as the National Defense Stockpile (hereinafter in this Act referred to as the 'stockpile').

"(c) Determinations under subsection (a) shall be known as 'stockpile requirements'.".

(c) Initial Level of Stockpile Requirements.—The determinations in effect as of October 1, 1984, under section 3(a) of the Strategic and Critical Materials Stock Piling Act shall be the stockpile requirements for the purposes of such section, as amended by this Act, until otherwise provided by law.

SEC. 3. TRANSFER OF CERTAIN STOCKPILE FUNCTIONS TO THE SECRETARY OF DEFENSE.

(a) In General.—Sections 5, 6, 10, and 11 of the Strategic and Critical materials Stockpiling Act (50 U.S.C. 98d, 98e, 98h-1, 98h-2) are amended by striking out "President" each place it appears and inserting in lieu thereof "Secretary".

(b) Definition of Secretary.—Section 12 of such Act (50 U.S.C 98h-3) is amended by adding at the end the following new paragraph:

"(3) The term 'Secretary' means the Secretary of Defense.".

(c) Technical Amendment.—Section 11(b) of such Act (50 U.S.C. 98h-1) is amended by striking out "each year" and all that follows through "the next fiscal year" and inserting in lieu thereof "each year, at that time that the Budget is submitted to Congress pursuant to section 1105 of title 31, United States Code, for the next fiscal year,".

SEC. 4. ANNUAL RECOMMENDATION OF STOCKPILE REQUIREMENTS BY SECRETARY OF DEFENSE.

The Strategic and Critical Materials Stockpiling Act is amended by adding at the end the following new section:

"ANNUAL RECOMMENDATIONS BY SECRETARY OF DEFENSE

"Sec. 14. (a) In General.—In order to assist Congress in establishing stockpile requirements under section 3, the Secretary shall submit to Congress an annual report on stockpile requirements. Each such report shall be submitted with the annual report submitted under section 11(b) and shall include—

"(1) the Secretary's recommendations with respect to stockpile requirements; and

"(2) the matters required under subsections (b) through (e).

"(b) National Emergency Planning Assumptions.—Each report under this section shall set forth the national emergency planning assumptions used in determining the stockpile requirements recommended by the Secretary. Assumptions to be set forth include assumptions relating to each of the following:

"(1) Length and intensity of the assumed emergency.

"(2) The military force structure to be mobilized.

"(3) Losses from enemy action.

"(4) Military, industrial, and essential civilian requirements to support the national emergency.

"(5) The availability of supplies of strategic and critical materials from foreign sources, taking into consideration possible shipping losses.

"(6) Domestic production of strategic and critical materials.

"(7) Civilian austerity measures.

"(c) Consideration of Materials Based on Net Import Reliance.—

"(1) In general.—In determining the materials to be recommended to Congress under subsection (a)(1) as strategic and critical materials (and the quantity and quality of such materials to be recommended), the Secretary shall consider—

"(A) whether each of the materials determined under paragraph (3) should be recommended as a strategic and critical material; and

"(B) in the case of any such material, whether the quantity determined under paragraph (5) with respect to such material is the appropriate quantity of such material to be established by Congress as the stockpile requirement for that material.

"(2) Matters to be included in report.—In each report under this section, the Secretary shall identify—

"(A) each material determined under paragraph (3); and

"(B) the quantity determined under paragraph (5) with respect to each such material.

"(3) MATERIALS TO BE IDENTIFIED.—The Secretary shall identify each material that the Secretary determines is necessary for the security of the United States, essential to the economy of the United States, and obtained from foreign sources.

"(4) CLASSIFICATION OF MATERIALS BASED ON NET IMPORT RELIANCE.—Each of the materials identified under paragraph (3) shall be classified by the Secretary for the purposes of this section as follows:

"(A) CLASS A MATERIALS.—A material shall be classified as a class A material if—

"(i) the material is not produced in the United States or is produced in the United States in limited quantities; and

"(ii) the net import reliance of the United States for the material is greater than or equal to 65 percent.

"(B) CLASS B MATERIALS.—A material shall be classified as a class B material if—

"(i) the material is produced in the United States but is not available in sufficient quantities in the United States; and

"(ii) the net import reliance of the United States for the material is greater than or equal to 30 percent but less than 65 percent.

"(C) CLASS C MATERIALS.—A material shall be classified as a class C material if—

"(i) the material is produced in substantial quantities in the United States; and

"(ii) the net import reliance of the United States for the material is less than 30 percent.

"(5) QUANTITY TO BE DETERMINE.—For each material identified under paragraph (3), the Secretary shall determine the following:

"(A) CLASS A MATERIALS.—In the case of a material classified under paragraph (4) as a class A material, the Secretary shall determine the quantity of such material equal to three years' net imports of such material.

"(B) CLASS B MATERIALS.—In the case of a material classified under paragraph (4) as a class B material, the Secretary shall determine the quantity of such material equal to two years' net imports of such material.

"(C) CLASS C MATERIALS.—In the case of a material classified under paragraph (4) as a class C material, the Secretary shall determine the quantity of such material equal to one year's net imports of such material.

"(6) DETERMINATION OF NET IMPORTS.—For purposes of paragraph (5), a year's net imports of a material is the quantity of the material equal to the amount by which—

"(A) the sum of—

"(i) the average annual imports of such material into the United States during the base period; and

"(ii) the average annual shipment of such material from the stockpile as excess material during the base period; exceeds

"(B) the average annual exports of such material from the United States during the base period.

"(7) BASE PERIOD DEFINED.—For purposes of paragraph (6), the term 'base period' means the most recent period of five calendar years for which data is available.

"(d) EFFECT OF ESTABISHING STOCKPILE REQUIREMENTS IN ACCORDANCE WITH DETERMINATIONS UNDER SUBSECTION (c).—The Secretary shall include in each report under this section an analysis of the effect (including the cost and the import on world markets) of establishing the stockpile requirements in accordance with the materials, and the quantities of materials, identified under subsection (c).

"(e) DIFFERENCES BETWEEN RECOMMENDATIONS AND NET IMPORT RESULTS.—When the stockpile requirements recommended by the Secretary in a report under this section differ from the materials and quantities that are identified under subsection (c), the Secretary shall also include in the report a detailed explanation for such differences, including—

"(1) a description of the assumptions used to determine the recommended stockpile requirements; and

"(2) a detailed analysis supporting the recommended quantity and quality for each material recommended as a strategic and critical material.

"(f) PERIODIC REVIEW.—The Secretary shall conduct a detailed review of the stockpile requirement for each strategic and critical material at least once every five years. If the Secretary determines at any time that the stockpile requirements for a material should be revised, the Secretary shall submit to Congress a report that—

"(1) notifies Congress of that determination;

"(2) sets forth the Secretary's recommended stockpile requirement for that material; and

"(3) sets forth the assumptions used by the Secretary in determining that recommended requirement.".

SEC. 5. STOCKPILE MANAGEMENT.

The Strategic and Critical Materials Stockpiling Act is amended by adding after section 14 (as added by section 4) the following new sections:

"INTERAGENCY AGREEMENTS

"SEC. 15. (a) AUTHORITY TO ENTER INTO AGREEMENTS.—The Secretary may enter into an interagency agreement with the head of any other department or agency for the performance of functions of the Secretary relating to section 6.

"(b) REIMBURSEMENT.—The Secretary shall reimburse the head of any such agency for expenses incurred by that agency in the administration of functions relating to the stockpile assigned to that agency by the Secretary under such an interagency agreement.

"APPROPRIATIONS TO BE MADE TO DEPARTMENT OF DEFENSE

"SEC. 16. Appropriations for the operation and management of the stockpile and for deposit to the National Defense Stockpile Transaction Fund shall be made as part of appropriations made to the Department of Defense for the military functions of the Department.".

SEC. 6. EXTENSION OF USES OF STOCKPILE TRANSACTION FUND AND CODIFICATION OF REVOLVING FUND PROVISIONS.

(a) IN GENERAL.—Section 9(b) of the Strategic and Critical Materials Stockpiling Act (50 U.S.C. 98h(b)) is amended—

(1) by striking out the second sentence of paragraph (1); and

(2) by striking out paragraphs (2) and (3) and inserting in lieu thereof the following:

"(2) Subject to section 5(a)(1), moneys covered into the fund under paragraph (1) are hereby made available (subject to such limitations as may be provided in appropriation Acts) for—

"(A) the acquisition of strategic and critical materials under section 6(a)(1);

"(B) transportation, storage, and other incidental expenses related to such acquisition;

"(C) development of current specifications of stockpile materials and the upgrading of existing stockpile materials to meet current specifications (including transportation related to such upgrading);

"(D) testing and quality studies of stockpile materials; and

"(E) other reasonable requirements for management of the stockpile.

"(3) Moneys in the fund shall remain available until expensed.".

(b) CONFORMING AMENDMENT.—Section 110 of Public Law 97-377 (96 Stat. 1911) is amended by striking out "Notwithstanding" and all that follows through "That during" and inserting in lieu thereof "During".

SEC. 7. MISCELLANEOUS TECHNICAL AMENDMENTS.

(a) TECHNICAL AMENDMENTS.—Section 4(a) of Strategic and Critical Materials Stockpiling Act (50 U.S.C. 98c(a)) is amended—

(1) by striking out "on the day before the date of the date of the enactment of the Strategic and Critical Materials Stockpiling Revision Act of 1979" in paragraphs (1) and (3) and inserting in lieu thereof "on July 29, 1979", and

(2) by striking out "on or after the date of the enactment of the Strategic and Critical Materials Stockpiling Revision Act of 1979" in paragraph (2) and inserting in lieu thereof "after July 29, 1979".

(c) CLARIFYING AMENDMENT.—Section 6(a)(3) of such Act (50 U.S.C. 98e(a)(3)) is amended by striking out "the form most" and inserting in lieu thereof "a form more".

Senator HUMPHREY. Senator Goldwater.

Chairman GOLDWATER. First, I would like to welcome my colleague from the House. Sometimes we are on opposite sides of the table for different purposes.

I would like to ask this question of both of you. My understanding of our strategic needs is that we import about 64 or 65 percent of all of our strategic needs. The question that comes to my mind is the degree of strategic items, chrome, titanium, and magnesium, for which we depend mostly on South African countries.

With the attitude of our Government relative to not just the countries of South Africa but other South African countries, do you think we are in trouble in keeping a supply of A, B, and C? Are we going to be able to keep an adequate stockpile of these strategic materials to ensure that we can build a nosewheel strut with a lot of chrome, stainless steel, and titanium?

Senator McClure. Mr. Chairman, I will be happy to respond in this way. The goals established under the formula in my proposed legislation which is now merged as an advisory goal in the composite suggestion that Congressman Bennett and I are suggesting would at least establish a more stable goal than has been the case under existing law.

It also provides in the legislation we are jointly suggesting to both this committee and the committee in the House that in whatever way the arbitrary formula would vary from our judgment as to stockpile goals, it would be set by the Congress of the United States.

The formula becomes advisory. There is not any question in my mind that the mineral belt through southern Africa is absolutely essential to the needs of a modern industrial society in peacetime as well as in wartime. I do not think we give that enough attention.

I think we are letting our own basic minerals industry in this country languish to the detriment of our own security. But we almost certainly must look to the availability of materials from other areas of the world and the ability to get them here in time of war.

I believe that it is important for us to have a stockpile of these critical materials and while you mentioned the average, an average is sometimes dangerous, some of the critical materials, some of the materials for which there is no economic or technical substitute, are not found in our country at all and we import all of them today.

Cobalt is a good example. We have no active cobalt mining in the United States, although there are some deposits in Idaho and in California that might be mined, but the sole domestic source of cobalt is scrap recycling.

Mr. Bennett. To continue on with what he is saying, it is obvious that we do have a tremendous shortage of some things that we have desperately needed. This legislation really addresses two things.

One, it moves us in the direction where we are going to acquire some of this material.

The other thing that it addresses is that it addresses the idea of having the Congress do, like it does in every other function in security, it has hearings and has actions on it which are observed by the public, the press sees it, and we are protected against evils because of that.

The present system we have is one which is done largely behind closed doors and it is a very dangerous system. As a result of it, you can have things done that are highly political and nobody really knows all the concepts that go behind it.

I used to be chairman of the Subcommittee on Military Construction and all of its activities used to be secret. I came to the conclusion, after I had those meetings for a while, that this is kind of a dumb thing to do because the only people who are making money out of secrecy—I hate to see it—are people who are real close to that committee, and the public ought to know all of this. So, we started having public hearings.

As a result of that, we have none of that problem. We had problems like that before, including even Members of Congress. We have never had such problems since. That is the situation here.

Of course, there would be some things you would still have secrecy, specific needs or a particular type of operation, but when you buy and sell things, the public ought to be brought into this type of thinking.

There are really two things in this legislation.

One, it puts it in a form where it ought to be, where all the other laws are in our country where there is going to be shown to the public what is being done, which is not now the case.

The other part is that we are going to get some materials in there that are greatly needed which are now overlooked.

Chairman GOLDWATER. I am very interested in what you said. I have been sitting on a similar committee for many, many years and being interested as I am in the needs of these minerals and the attitude our Government now has against countries like Angola, South Africa, and Zimbabwe, where we get most of these materials means to me that we are going back to the old practice of buying them from Russia who in turn buys them from these countries.

That is not a good way to do business. I am just wondering in any legislation that you propose if you made it clear to the State Department that we cannot live without some of these metals regardless of what the countries are doing?

Mr. BENNETT. I think, unfortunately, many of the functions of Government are controlled by the Office of Management and Budget. We recently had a disclosure of what they do. This is not the way this ought to be run.

You mentioned one thing and that is dependence on very fragile governmental structures that we may or may not be able to come to at some time in the future.

There is another thing, too, regrettably—I hate to say this because I have many friends on the Merchant Marine and Fisheries Committee—both you and I have seen our merchant marine go from a number one position down to about eleven, being far outdistanced by very minor countries, including some that are not as strong as we are.

That being the case, we are going to have difficulty, if we have a war, moving this material anyway. It is wise to stockpile. All of it is an asset. All of this stuff can make money. All of this stuff we have set out to buy has made money for the country because it has gone up in value.

There are a few things we got for the stockpile which we did for political international reasons which had nothing to do with stockpile. The State Department bought some things in order to make some countries happy. That sort of stuff sometimes does not continue its value.

We got hemp and flax and things like that which have deteriorated. Most of the things in the stockpile have gone up in value. When the market changes, you can sell them at the proper time in the market which would be helpful to everybody to do it that way.

Senator HUMPHREY. Gentlemen, thank for for your testimony. We will carefully examine your proposals. There is something that needs to be done, it would seem.

Senator MCCLURE. Mr. Chairman, could I add one thing?

Senator HUMPHREY. Yes.

Senator MCCLURE. I think I would be remiss in my duty, not only to my constituents, but to you, too, if I did not mention the good relationship between the silver purchases and sales to the stockpile and the transaction funds.

I think a number of people believe I put this bill in initially just because of silver. While silver is very important to us in Idaho and we produce over half of the silver produced in the United States in Idaho's First Congressional District, that is not my motivation.

There is a problem with respect to the transaction fund because we have silver surplus to Treasury's needs which is not technically a part of the stockpile.

The question of the sale of silver also has a relationship to the transaction fund and OMB and others want money to come into the transaction fund to finance the purchase of other needed and critical materials.

If there is, indeed, a problem there that drives some kind of a decision, I would suggest that the way to solve that problem is not to mandate the sale of stockpile silver, further depressing the supplies, but to continue the minting and sale of coins which does not depress the price, but does come from Treasury stocks at the present time, and to address that separation rather than simply try to change the method of operation or mode of operation in the sale of silver.

Senator HUMPHREY. I understand. Thank you very much.

Senator MCCLURE. Thank you, Mr. Chairman.

Senator HUMPHREY. I will ask our next witness, Dr. Simon Strauss, to come to the table, former vice chairman of ASARCO, Inc., chairman emeritus of the AMC Minerals Availability Committee.

Good morning, Doctor.

STATEMENT OF SIMON D. STRAUSS, FORMER VICE CHAIRMAN, ASARCO, INC., CHAIRMAN EMERITUS, AMC MINERALS AVAILABILITY COMMITTEE

Mr. STRAUSS. Good morning.

Mr. Chairman, I am submitting the full statement for the record of the committee. Some of it duplicates what Congressman Bennett and Senator McClure have already said. So, with your permission, I will make a fairly brief statement.

Senator Humphrey. Fine.

Mr. Strauss. The proposal to sell material from the stockpile is based on the belief by the administration that it can safely do so and that belief appears to be based on four, what I would call macroeconomic factors.

The first is that the consumption of these strategic materials can be drastically reduced by cutting out nonessential civilian production in the event of war.

The second is that domestic mine production can be increased in the event of war so that we supply more of these materials from within the country.

The third is that we will substitute other materials for strategic materials in the event of war.

And the fourth is that we can increase the recycling of these strategic materials.

All of these are, on the face of it, plausible approaches. However, there is a basic problem with respect to all four.

With regard to the first, it is true, and we saw that in World War II, that we can reduce the consumption of strategic material used in the production of nonessential civilian goods such as automobiles. During World War II, the production of automobiles was prohibited. However, any savings that are a result of cutting back on civilian production, in my opinion, in any further conventional military effort will be more than offset by increased demands, not only for the military, but for the industrial structure which supports the military.

I do not accept the theory that we can actually reduce the aggregate amount of strategic materials used if we are fighting a war, and yet this seems to be one of the fundamental assumptions made in the present approach to the sale of stockpiled materials.

The second point: Increasing domestic production of strategic materials. This is possible. It is possible at a very considerable cost because the strategic materials that we are not producing, but of which we have deposits in this country, are high-cost sources.

Furthermore, due to the decline in the status of the mining industry, it will take time to gear up domestic production. During World War II, it was necessary to grant exemption from military service to those people engaged in the mining industry in order to permit the expansion of domestic production.

These individuals had precisely the skills that our military forces required. I am speaking now of people driving trucks, operating shovels, bulldozers, rock drills, skills of this kind which both the Army Engineers and Navy Seabees desperately needed.

Yet these people were deferred from military service because it was important to not maintain, but increase domestic production. Instead of that, we had to train stockbrokers and shoe salesmen how to be engineers, and that took time. It takes time to build new facilities.

The third point: Substituting other materials for the strategic materials. Substitution is an ongoing process which is constantly undertaken by industry because it seeks more efficient and more economic materials all the time and very notable savings have been made and are being made, but these cannot be forced.

You cannot change overnight from the use of material A to material B. For example, a recent Government study suggested that the mirror industry, instead of using silver, switch to copper or aluminum. To make a change of this kind requires time, it requires the retaining of labor, it requires the installation of new equipment.

The fourth item, which apparently is emphasized by administration people who believe that our present stockpiles are excessive, is that we can increase the recycling of strategic materials—notably the metals. It happens that the recycling industry in this country is a highly organized and highly efficient organization and there is plenty of economic incentive to undertake recycling now.

The thought that we can suddenly, overnight, wave a magic wand and increase the quantity recycled is a myth because the collection, sorting, storage, and actual processing of scrap is a very time-consuming business and is a business that requires a lot of facilities.

Mr. Chairman, what I have been saying to you is that, in essence, while it is plausible to suggest that we can increase production, make substitution and increase recycling, there is a common thread that runs through all of these and that is the time involved, and time, I would like to suggest, is the most precious commodity we have, apart from the lives of our fighting forces in the event of war.

During World War II, all of these measures were undertaken, but they took time and they were very costly and, in my judgment, they resulted in a serious delay in the eventual victory that we achieved.

For example, we lost a sizable proportion of our merchant marine that was engaged in the transportation of the precise goods that, under the program adopted by the Carter and Ford administrations, were identified as being needed for stockpile, but which the new approach says we do not need for stockpile. It will be very hazardous to try to bring in materials during war.

Now, Mr. Chairman, I would just like to call your attention to the tabulation which accompanies my statement. It addresses the very question that Senator McClure and Congressman Bennett talked about, the question of our dependence on southern Africa.

In this tabulation, I show the existing goals for six materials: chromium, cobalt, manganese, platinum, palladium, and iridium. All six of these materials originate in southern Africa. Not just South Africa, but also in Zimbabwe, Zambia, and Zaire.

Compared with the existing goals, the table shows the 1985 proposals submitted by the administration as to what the stockpiles should be for these materials. You will note a very drastic reduction in these proposals. The actual stockpile itself would only contain chromium and cobalt; no manganese, platinum, palladium, or iridium.

There is proposed a supplemental reserve, the exact legal status of which has not been very carefully spelled out and, therefore, creates questions in people's minds. There would be additional chromium and cobalt in the supplemental reserve and also a quantity of manganese. There would be no platinum, palladium, or iridium.

Then I show the present holdings, and, by present, I mean as of September 30, 1985, in the statement submitted by the Federal Emergency Management Agency, and you will see that we have substantial amounts in the stockpile now; not up to the goals with the single exception of manganese, but nevertheless, substantial.

Yet the quantities are in every case in excess of the administration's July 1985 proposals.— —

Then I show the annual consumption of these commodities in 1985 for chromium, cobalt, and manganese and for 1984 for platinum, palladium, and iridium because I have been unable to get a breakdown as yet as to the 1985 figures.

I show you also what sales are now proposed. You will see that the proposed sales deal only with a portion of the material ranked as excess, but it strikes me as being extremely unwise, considering the hazardous situation politically that exists in southern Africa, for the stockpile to dispose of any of these materials, and yet that proposal is encompassed within the letter that was written, I believe to the Speaker of the House, by the General Services Administration.

Mr. Chairman, that completes my oral presentation. I, of course, will be glad to answer any questions.

[The prepared statement of Mr. Strauss follows:]

PREPARED STATEMENT OF AMERICAN MINING CONGRESS ON NATIONAL DEFENSE STOCKPILE POLICY BY SIMON D. STRAUSS, CHAIRMAN EMERITUS, MINERALS AVAILABILITY COMMITTEE, AMERICAN MINING CONGRESS AND CONSULTANT ON MINERAL ECONOMICS

Mr. Chairman and members of the committee, I am here to testify in regard to the General Service Administration's proposal that it be authorized to sell a long list of materials now in the national strategic stockpile. I speak on behalf of the American Mining Congress, an industry association that encompasses (1) producers of most of America's metals, coal and industrial and agricultural minerals; (2) manufacturers of mining and mineral processing machinery, equipment and supplies; and (3) engineering and consulting firms and financial institutions that serve the mining industry. We appreciate the opportunity to state our views.

Last July the Administration announced its intention to make major reductions in stockpile goals. These revisions, so far as we know, have not yet been formally adopted—but the proposed sales apparently assume that they will be promulgated. Meanwhile they are being actively discussed in the Congress. Your sister committee in the House of Representatives in February held hearings on proposed legislation that would make stockpile goals subject to Congressional approval. This proposal is also still under consideration.

Meanwhile, however, the Administration desires to realize revenues from stockpile sales to assist in reducing the Federal deficit. This is made evident in the final paragraph of the draft bill submitted by the General Services Administration. It provides for transfer to the General Fund of the Treasury by the GSA Administrator of receipts that would otherwise, under existing law, accrue to the National Defense Stockpile Transaction Fund.

Existing legislation stipulates that the stockpile shall hold strategic materials in amounts sufficient to meet military, industrial and essential civilian needs of the United States for national defense. Until now the determination of what constitutes sufficient amounts has been made by the Executive branch of the government. Changes in goals for specific materials have been frequent. In outlining proposed changes in a statement released by the White House on July 8, 1985, the amounts were described as adequate to meet needs for a 3-year conventional global military conflict. The study leading to the changes was said to have taken two years and involved thousands of hours of review at staff and policy levels among twelve different agencies.

Radical changes in stockpile goals have been frequent during the forty-year existence of the program under legislation enacted by the Congress in 1946. During the Truman and Eisenhower administrations substantial stockpile goals were established, drawing on problems encountered in World War II and Korea. Reviews made under the Kennedy, Johnson and Nixon administrations concluded that the stockpile was too large. Goals were reduced, buying ceased, and substantial disposals were made.

Congressional concern over proposed disposals caused the Ford administration to make further revisions—this time restoring goals to a level judged adequate for a three-year conventional war. The Carter administration made its own assessment, substantially confirming the program then in effect, and a modest new buying program was launched for certain items, while disposal of other commodities deemed in excess continued. However, the bulk of the materials now in stockpile represent purchases made prior to 1963. As of September 30, 1985, the Federal Emergency Management Agency reported the materials on hand had a current inventory value of $10 billion.

The revisions proposed by the Reagan administration study would establish two categories of holdings. One, designated as the stockpile, would consist of materials with a value of $700 million at July, 1985, price levels. A second category, designated as a supplemental reserve, would consist of just under $6 billion in materials at July, 1985, price levels. The precise status of this supplemental reserve has not been clearly defined but it was described as materials already possessed by the government that would offer additional assurances against materials shortages during military conflict.

From the figures it is clear that there would be $3.3 billion in present holdings which the Administration would hope to sell. The proposal before you is the first step in the liquidation of quantities that are no longer considered by the Executive branch to be essential.

Since no one knows the future, the calculation of stockpile goals has always involved making broad assumptions regarding the nature of any future conflict in which the nation may be involved. Change the assumptions and the indicated stockpile needs will change. In the case of the recent study some of the material involved is classified as confidential or secret. However, one can derive some of the broad underlying assumptions from various public statements that have been made.

One such assumption is that in the event of global war production of certain civilian goods would be suspended—passenger cars for example. This was done during World War II and resulted in major savings in requirements for raw materials, which, however, were more than offset by the voracious raw-material needs of the military effort. The current study apparently assumes that the savings resulting from suspension of non-essential civilian output would be greater than military requirements and actual total use of strategic materials would fall in wartime. In our judgment this is a highly questionable assumption.

A second assumption is that domestic production of strategic materials can be quickly increased in the event of war. The grim fact is that domestic production has been declining and import dependency has increased. Between 1974 and 1985 U.S. mine production of bauxite fell 66 percent; copper 33 percent; iron ore 49 percent; lead 35 percent; tungsten 67 percent; and zinc 50 percent. The country does have substantial mineral resources but to reactivate production will take money and time and recruiting of new labor cadres. All of this is difficult in wartime, as was amply demonstrated in previous emergencies.

A third assumption is that more abundant materials will be substituted for scarce strategic commodities in the event of war. The process of substituting less costly or more readily available elements is an ongoing one—in peace as well as in war. However it requires new equipment, retraining the work force, and inevitable delays. If done without adequate testing and preparation it can result in shoddy or faulty products.

A fourth assumption is an increase in recycling of materials by salvaging increased quantities of obsolete items. This requires added facilities for collecting, sorting, storing and processing scrap. The secondary materials industry is a highly efficient one. Dramatic increases in the volume of recycled goods cannot be accomplished overnight.

From this brief summary it is apparent that the common ingredients in these approaches to solving the problem of strategic materials availability in wartime are time and money, both of which are at a premium in the event of war. The stockpile was the solution to this dilemma that recommended itself to the leaders of both political parties after the trauma of World War II and Korea. Is it wise now to dismantle the stockpile as the executive agencies are suggesting?

Time will not permit a discussion of the specific position of each of the commodities it is now proposed to sell. I would like to speak briefly about six of these commodities as an illustration of the over-all problem. The Commodities are chromium, cobalt, manganese, iridium, platinum, and palladium. I have prepared a table that shows the stockpile goal; the proposed changes under the July, 1985, White House statement; the actual amounts now in stockpile; the U.S. consumption in 1985; and the sales now proposed under the legislation that is being sought.

These six commodities have two characteristics they all share. There is no signficant domestic production of any of them, other than recycling from scrap. The major share of the Free World's production of each originates in southern Africa, an area beset with political problems. By a strange quirk of fate and geology, except for cobalt, the Soviet Union is the other important source of these materials.

In the case of cobalt, the stockpile has had a history of sharply fluctuating goals and alternating periods of accumulation and sale. Prior to 1963, about 100,000,000 pounds of cobalt had been accumulated. Between that year and 1974 about 60,000,000 pounds of cobalt was sold by the stockpile at average prices under $2.50 a pound. Zaire is the largest producer of cobalt. When insurgency flared up in 1978 the cobalt market went into orbit—prices reaching as high as $40 a pound. As a result of the concern resulting from these political developments, the stockpile goal was raised to 85,400,000 pounds. When buying for the stockpile was resumed, the first purchase made was 5,200,000 pounds at a price of $15 a pound—six times the price at which the government had previously sold. Subsequently another 5,000,000 pounds was acquired at somewhat lower prices. But now it is proposed to sell 1,164,000 pounds with the market at about $9 a pound and likely to show weakness if approval is given for disposal.

The financial consequences of stockpile transactions in cobalt have been that the government has in recent years bought dear and sold cheap. Cobalt is an essential element in production of jet engines, super-alloys, and magnets; it has important application in medicine that would be valuable in wartime.

The three platinum-group metals—palladium, platinum and iridium—are currently produced to the extent of over 90 percent of world supply in just two countries—the Soviet Union and South Africa. There is a potential for producing these metals in Montana, but initial output is expected to be in the order of 5 percent of domestic requirements. The Executive branch is now proposing that stockpile goals for these three metals be completely eliminated despite import dependence. The argument is made that in the event of war platinum requirements can be met by recycling platinum now contained in catalytic convertors to remove pollutants from automotive exhausts apart from the question of reverting to a high level of air pollution which the government has been at pains to reduce, the disruption involved in requiring car owners to submit their vehicles to this procedure, the call on automobile mechanics to devote their time, the problems of collecting and recycling the converters in processing plants that do not now have the capacity to cope with such a volume these will be major diversions from the prosecution of a war should one occur.

While the largest use of platinum is in automotive catalysts, it has major applications in electrical and electronic devices, in the ceramic and glass industries, and in the chemical and petroleum industries. Palladium's largest uses are in electrical and electronic devices and in the dental and medical field. The pattern for iridium is similar. The decision to eliminate these three items from the stockpile program is puzzling, in view of the dependence on sources that must be considered uncertain.

Chromium and manganese are two commodities used chiefly as ferro-alloys, although they do have some other applications. The United States has low-grade resources of both which have not been viable in competition with overseas sources. Here again South Africa and the Soviet Union are the largest producers, accounting for about 60% of global supply. Turkey, Zimbabwe, India and the Philippines are alternate sources for chromium while Gabon, Australia, Brazil, India and Mexico do provide manganese exports. Clearly, except for Mexico, long sea lanes are involved in the movement of these bulky commodities. Shipping losses were heavy in World War II and given the scope of the Soviet submarine fleet would be a serious problem in the eventuality of a war between the superpowers.

In the past most imports of these items were in the form of ores for conversion into ferro-alloys here. Domestic ferro-alloying capacity has shrunk drastically in the last twenty years and now most imports are in the form of ferro-alloys rather than ore. The proposed revision eliminates a manganese stockpile but does provide a supplemental reserve equivalent to a little over one year's peacetime consumption. The revision does provide for about a six-month stockpile of chromium plus another eighteen-month supplemental reserve based on the consumption rate in 1985. GSA is asking for authority to sell chromium in the form of ore and manganese in the form of manganese metal; it has a residual authority to sell some manganese ore under previous legislation.

While some chromium can be recycled, in practice there has been little or no recycling of manganese. For the most part the latter element is so widely dispersed in scrap steel that its separation and conversion is not practicable.

Mr. Chairman, the stockpile was established for purposes of national defense. It was not intended to be used for economic or budgetary purposes. The American Mining Congress regards it as valuable insurance against unforeseen and unforeseeable contingencies. We hope that in considering the proposals before this committee, you and your associates will recognize the intangibles it represents and the experience that led to its creation originally.

I have necessarily eliminated many facets of the problem in my presentation. I shall be pleased to respond to questions on my testimony or any other aspects on which I am competent to make comment. Thank you for your attention.

STATUS OF MINERALS FROM SOUTHERN AFRICA UNDER PROPOSED STOCKPILE LEGISLATION

Mineral	Existing goal	July 1985 proposals		Present holdings	Annual U.S. consumption, 1985	Sales now proposed
		Stockpile	Supplemental reserve			
Chromium (short tons) [1]	1,353,000	199,000	594,000	1,268,000	390,000	[2] 160,000
Cobalt (pounds)	85,400,000	22,570,000	6,000,000	50,191,000	15,000,000	1,164,000
Manganese (short tons) [1]	1,500,000	0	869,667	1,911,000	670,000	[3] 1,600
Platinum (ounces)	1,310,000	0	0	453,000	[4] 1,028,000	58,000
Palladium (ounces)	3,000,000	0	0	1,255,000	[4] 1,256,000	70,000
Iridium (ounces)	98,000	0	0	28,000	[4] 7,000	2,200

[1] Chromium and manganese figures are for contained metal, not gross weight. Several categories of each element are contained in present stockpile goals and these cover both metallurgical and chemical grades of ore as well as the metallic element.

[2] In addition to 160,000 tons of ore (gross weight) the proposed sale includes 2,400 short tons of chromium ore, metallurgical grade.

[3] Proposal is confined to 1,600 tons of electrolytic manganese metal. There is existing authority to dispose of manganese ore, both of metallurgical and battery grade.

[4] U.S. Bureau of Mines 1986 mineral commodity summaries does not break down consumption of platinum-group metals by the individual elements. However, figures indicate aggregate 1985 consumption was approximately the same as in 1984. These figures are for actual consumption in 1984.

Senator HUMPHREY. Thank you, Dr. Strauss.

You have been following these matters for some years?

Mr. STRAUSS. Forty-three to be precise.

Senator HUMPHREY. What is your understanding of the process by which the administration came to this latest proposal?

I am assuming with all the contacts you have that you must have a pretty good fix on how this all came about.

Can you share any of that with us, from your perspective?

Mr. STRAUSS. From my perspective, an interagency group was assembled under the direction of the National Security Council, apparently sometime in 1983. I am not sure as to when. They undertook a good deal of modeling of expected wartime scenarios.

They made various assumptions with regard to what could be done in limiting civilian consumption of goods and what the actual defense requirements would be and what the requirements would be for the industrial establishment that would support the actual fighting forces.

There was, as I understand it, protracted debate within the agencies. I have been allowed limited access to the modeling because I am classified as having access to certain types of restricted information, I was walked through one or two of the commodities, but by no means all.

I have decided not to make myself available to examining more of this information because I do not want to be subject to the criticism that is often expressed of people in private industry that they are leaking classified information.

So, let me say that it appears from what I have seen that the overall impression that the administrative agencies or the conclusions that the administrative agencies came to were that it would be possible to fight a 3-year war with the new objectives. The public release that was sent over in July to the Congress specifically stated that the new goals allowed for a 3-year conflict.

So, the assumption was made that this 3-year conflict could be fought with a lesser flow of strategic materials than our peacetime consumption. This is a concept that I find very difficult to accept in the light of my experience during World War II.

I know, of course, that older people such as myself are accused of living only in the past, but George Santayana, a philosopher, once said that "Those who do not learn from the mistakes of the past are doomed to repeat them."

While undoubtedly the nature of warfare will be different than it was in World War II, the nature of our industrial society has not changed all that much. The interdependence of our society has not changed all that much.

I recall one incident out of World War II which I would like to offer as an example. It was before Pearl Harbor in the spring of 1941. People were concerned about access to two commodities coming out of Southeast Asia, tin and rubber, because we had no domestic supplies of native rubber or of tin.

So, it was decided to give highest priority ratings to all imports of tin and rubber from that area and to downgrade the importance of the other materials. The gentleman who was in charge of this at what was then called the Office of Production Management, later the War Production Board, looked over the list of imports and noted that we had imported 100,000 tons of tapioca in 1940 from what was then Indonesia.

He decided that children could eat jello rather than tapioca for dessert and he put a red pencil through the tapioca item. What he did not know and did not take the trouble to ascertain was that tapioca was also used as an adhesive by the plywood industry. At the time the Mosquito bomber was being built at Baltimore by the Glenn Martin Co., out of plywood in order to avoid detection on the German radar screens.

By cutting off the tapioca, we threatened the production of those Mosquito bombers. Fortunately, the error was rectified after a few weeks. I simply bring this out because to me it is illustrative of how interdependent our society is on a wide complex of materials.

I do not believe that it is possible for any group of people, however prescient they may be, to sit around a table and make correct assumptions as to what the wartime needs of their society will be.

It is for that reason that I strongly endorse the thought that Senator McClure brought before you this morning which is that we should start by looking at our degree of import dependence on these materials and should arrive at some kind of approximation of what our needs might be from looking at that import dependence and we should deviate from that only under the clearest kind of evidence that that degree of import dependence would not continue in the event of war.

Senator HUMPHREY. Some allege, at least suspect, these stockpile goals are driven primarily by budgetary considerations.

Do you have any reasons to believe that?

Mr. STRAUSS. I think the strongest grounds for believing that is the fact that Congressman Bennett brought out which is that the proposal now is not to have the funding flow into the stockpile transaction fund, but rather to go into the general fund of the Treasury.

Furthermore, as I understand the figures, and I do not have them fresh in my mind, it would not only be the proceeds from these proposed sales that would be transferred, but also some of the accrued funds that are now in the transaction fund that would be transferred.

I share with most citizens the concern about the Government's deficit and I would like to see that deficit reduced or, if possible, eliminated. But I think in doing that, we need also to weigh the effects on our ability to defend ourselves.

I really feel that this downgrading of the stockpile, which is really what is being proposed, is a very dangerous way to proceed to meet our budgetary situation.

Senator HUMPHREY. Have you read the August-September issue—I do not know what this excerpt is from. It does not bear the name of the magazine, but it is an article by Joel B. Clark and Frank Field III, Associates at MIT.

Mr. STRAUSS. Yes, I believe that was actually the MIT magazine. I read it some time ago.

Senator HUMPHREY. They seem to endorse the administration's position, suggesting, first of all, that:

"In today's world it is virtually impossible to shut off any one country from access to critical materials."

You read Santayana's admonition to the future generations, and to be sure, things sometimes stay the same, but they also change.

Has the world economy now and strategic resources changed in that respect since World War II, for instance.

Mr. STRAUSS. Mr. Chairman, in peacetime you cannot shut off access to strategic materials. What we are talking about here is not peacetime, but wartime. I do not think that statement is a correct statement with regard to wartime.

In the event of wartime, I cannot imagine, for example, that we would have access to Russian chrome, manganese, or the platinum metals. So, the stockpiles are not geared to assure access in peacetime. They were established for the purpose of assuring that we would have supplies in the event of wartime.

Not just supplies, but also the points that I mentioned before, that we would have the time with which to expand domestic production or to convert to the use of other materials or to increase recycling. That is what the stockpile is, it is insurance.

Senator HUMPHREY. Are these professors at MIT qualified to——

Mr. STRAUSS. I do not know the second gentleman. Joel Clark is a very distinguished young man who is professor of materials engineering who in fact has invited me to come, and I have in fact given a number of lectures at MIT.

Joel is doing a lot of work in the field of composite materials which is a rapidly developing science and perhaps 40 or 50 years down the road these products will have supplanted many of the materials now being considered strategic and essential. But that is not the case today.

The stockpile is here to assist us to meet an emergency which might develop in the course of the next decade or so.

Senator Humphrey. Thank you, Dr. Strauss.

Mr. Strauss. Thank you.

Senator Humphrey. We welcome Mr. Maguire, Associate Director for National Preparedness Programs, FEMA.

Mr. Maguire.

STATEMENT OF BERNARD A. MAGUIRE, ASSOCIATE DIRECTOR, NATIONAL PREPAREDNESS PROGRAMS, FEDERAL EMERGENCY MANAGEMENT AGENCY, ACCOMPANIED BY DR. JOHN D. MORGAN, JR., CHIEF STAFF OFFICER, BUREAU OF MINES, DEPARTMENT OF THE INTERIOR; DR. THOMAS G. MOORE, MEMBER, COUNCIL OF ECONOMIC ADVISORS; RICHARD DONNELLY, DIRECTOR OF INDUSTRIAL RESOURCES, DEPARTMENT OF DEFENSE; WAYNE KULIG, ASSISTANT COMMISSIONER, OFFICE OF NATIONAL STOCKPILE, GENERAL SERVICES ADMINISTRATION

Mr. Maguire. Good morning.

I should like to submit my written statement for the record.

Senator Humphrey. Fine.

Mr. Maguire. And summarize the remarks in the following comments.

Before I proceed, I would like to introduce to you the members of the panel I have here to provide expert testimony.

Dr. John Morgan from the Department of the Interior, the Honorable Thomas Moore who is acting chairman of the Council of Economic Advisors; Dick Donnelly, Defense Department; and Wayne Kulig from the General Services Administration.

Also present are quite a few other representatives who are able to provide expert testimony in support of the administration's position.

I believe I would like to ask Tom Moore to make an opening statement.

Senator Humphrey. Will you keep it brief. You are not going to call on all of these gentlemen?

Mr. Maguire. No, sir.

Dr. Moore. I will not make an opening statement and I am not the Acting Chairman of the Council of Economic Advisors. Dr. Beryl Sprinkel, who is in town, is very much the chairman.

Mr. Maguire. My apologies.

The Federal Emergency Management Agency is responsible for the coordination of national defense stockpile policy under National Security Council guidance and under Presidential Executive order. That order delegates stockpile oversight responsibilities to FEMA.

To achieve our mission, we rely heavily upon the active participation and the expert contributions of the other executive branch agencies. We rely on those agencies to contribute the expertise based on their ongoing responsibilites: The Defense Department, the Joint Chiefs of Staff, Interior Department, Commerce Department, State Department, Department of Energy, and others involved in the stockpile formulation process.

Representatives with me today are prepared to support the purpose of this hearing. Let me focus my direct remarks on the administration's proposed stockpile modernization legislation and subsequently on other stockpile-related bills under consideration.

First of all, the President's modernization proposal is the result of 2 years of effort by an interagency body and it entails thousands of hours of review. The final report consumed over 800 pages of analytical detail that went into all of the complex background information that was needed to derive a set of goals that was agreed upon by all.

The results of the analysis showed that there were two tiers necessary to formulate stockpile goals. The two tiers valued as of March 31 of this year are $5.4 billion worth of strategic and critical materials.

Tier one of the stockpile, the actual goals themselves consists of $600 million worth of materials and the second tier, the supplemental reserve, consists of $4.8 billion.

The $600 million worth of goals in tier one consists of those materials which are not available in sufficient quantities for a protracted conventional conflict.

The supplemental reserve is clearly outlined in the President's proposed program as those materials which would be held aside for a 5-year period. They would not be disposed of, but would be available to supplement the existing stockpile.

The administration proposed to sell excess materials avoiding market disruptions over the next 5 years.

We have proposed further to consult and work with Congress in formulating the program by which we would accomplish this end.

Let me now speak, Senator, if I may, to Senate bill S. 2102 which prescribes the method for determining the exact quantities of materials stockpiled based on U.S. peacetime imports of materials. Its advantages is its simplicity. The disadvantages, however, outweigh the sole advantage.

If our stockpile goals were determined by imports, the goals would be subject to annual fluctuations. We would, in addition, have materials far in excess of actual wartime stockpiling requirements.

The result calculated recently showed in excess of $15 billion worth of materials would be required, certainly larger than is needed for national defense-related purposes.

The most serious shortcoming, as pointed out earlier by Senator McClure in S. 2102, is that the formula does not take into account wartime military production requirements. Wartime requirements are much different from those related to peacetime consumption of imported materials for some materials.

In summary, the administration opposed S. 2102 for two reasons:

The formula does not reflect actual national security needs.

And there will be an excessive price tag to implement S. 2102.

With regard to the second bill submitted by Congressman Bennett, H.R. 3743, this bill would place all responsibility for fiscal and organizational control of the stockpile with the Secretary of Defense.

The President is responsible for mobilization planning as Commander-in-Chief of the Armed Forces. It is the administration's position that all three requirements must be taken together, the military, the industry and essential civilian requirements in order to plan for a major mobilization and resulting 3-year conventional conflict.

The goals, therefore, are best established by the existing expertise—the Defense Department, in addition to the Joint Chiefs of Staff, the Department of State, the Department of the Interior, and the Department of Commerce.

The interagency body that has been working on stockpile-related issues for a number of years has the ability to put together the goals and can do it in a way that all military, industrial and essential civilian requirements are considered.

The Department of Defense is already a participant in these interagency forums and they will continue in that mode in the administration's stockpile goal formulation process.

In summary, the administration strongly opposes H.R. 3743 and with that, Mr. Chairman, I would like to respond to any questions you might have and call on other members of the administration to provide expert testimony.

[The statement of Mr. Maguire follows:]

PREPARED STATEMENT BY HON. BERNARD A. MAGUIRE, ASSOCIATE DIRECTOR FOR NATIONAL PREPAREDNESS PROGRAMS, FEDERAL EMERGENCY MANAGEMENT AGENCY

Mr. Chairman and members of the subcommittee, I am Bernard A. Maguire, Associate Director for National Preparedness of the Federal Emergency Management Agency [FEMA]. FEMA coordinates National Defense Stockpile policy under guidance from the National Security Council [NSC] and relies on the expert contributions of many Executive agencies which participate in the stockpile program such as the Department of Defense [DOD], the Joint Chief's of Staff, the Departments of the Interior, Commerce, Energy, State, and the Treasury, the Central Intelligence Agency [CIA], the Council of Economic Advisors [CEA], the Office of Policy Development, and the Office of Management and Budget [OMB].

I welcome this opportunity to testify for the Administration on the National Defense Stockpile program. I shall address my remarks first to the President's proposed stockpile reforms and I will comment on other stockpile related bills currently before the Congress.

On July 8, 1985, the President proposed to modernize the National Defense Stockpile of strategic and critical materials. This proposal came after 2 years of interagency study and thousands of hours of review at the staff and policy levels at twelve different agencies.

The President announced, his intention that the administration would consult and work with the Congress on this important national security program before the new stockpile goals would be transmitted. Over the past nine months the Administration has briefed congressional members and their staffs on the classified study upon which the President's proposal was based. This afternoon in the classified portion of the hearing, key study participants will be available to answer any questions you may have about details of the study and proposed reforms.

On the basis of the stockpile study of materials requirements and supplies during a protracted military conflict, the President decided that the stockpile for the 42 materials studies will now contain $5.4 billion (March 1986 prices) in materials and include two tiers.

Goals of $0.6 billion (Tier 1) were proposed for materials that would be required during a protracted military conflict that would not be available in sufficient quantities from domestic or reliable foreign sources. The stockpile also would contain a supplemental Reserve of strategic and critical materials currently valued at $4.8 billion (Tier II) which would contain materials that the U.S. Government already possesses. This reserve would offer additional assurance against materials shortages during a period of military conflict. Both Tiers of the stockpile would provide over one year's peacetime levels of imports for such materials as chromium, manganese, cobalt and tantalum.

The President decided to sell some of the surplus material stocks in a manner—over the next 5 years—that minimizes market impacts. An interagency group would evaluate ways to ensure that stockpile sales do not cause undue market disruptions.

This Committee is also considering S. 2102, a bill which proposes an alternative to current statutory provisions for determining goals for the National Defense Stockpile. The Administration strongly opposes this bill. S. 2102 would prescribe the method for determining the exact quantity of any material to be stockpiled based on U.S. peacetime imports of materials. While the apparent simplicity of this methodology may be appealing, our analysis of this proposed change in method indicates that goals could be subject to yearly changes and that materials far in excess of national security requirements would be stockpiled. For example, S. 2102 would establish a goal of over 200 million ounces for silver valued at $1.1 billion which would require substantial additional and unnecessary stockpile acquisitions. A large portion of peacetime consumption of silver is for luxury nonessential civilian goods. Almost half of the silver consumed in the United States is for photographic purposes alone, of which a significant portion is nonessential. Other significant and nonessential uses include silver for jewelry and sterlingware, and electroplated ware. S. 2102 would result in goals of over $15 billion largely for production of nonessential consumer goods during a war.

The goals derived under the S. 2102 formula would not be responsive to the national security objectives of the Strategic and Critical Materials Stockpiling Act. The most serious shortcoming is that the S. 2102 formula does not take into account wartime military requirements which are very different from peacetime consumption levels for some materials. Other factors also significantly affect our materials requirements during wartime, such as:

The continued accessability of some foreign sources of supply in wartime, which may in fact provide higher-than-peacetime rates of supply of stockpile materials;

Shifts in civilian consumption during wartime away from durables into nondurables and services, which often do not require stockpile materials;

Substitutions of alternative non-stockpile materials; and

Wartime expansions of domestic production of stockpile materials.

Because this peacetime formula would not identify our national security needs and would impose an excessive price tag for acquiring unneeded materials—thereby reducing available funds for priority defense programs and compromising our national security—the administration strongly opposes S. 2102. The President's stockpile modernization proposal, in the other hand, is based on full consideration of these requirements and sources of supply as well as other important mobilization factors.

The administration also strongly opposes H.R. 3743. This bill would change existing statutes in a way that prevents the President from determining the best organizational and financial placement of resources to conduct the National Defense Stockpile program. The bill would place all these responsibilities directly under the Secretary of Defense. Such a move is inappropriate.

The President, as Commander-in-Chief of the Armed Forces, has overall responsibility for mobilization planning to ensure that force levels and structure are appropriate to defend against threats facing the nation.

Goals for stockpile materials are established using mobilization planning assumptions that are consistent with those used for all U.S. armed forces planning. The goals are set using the expertise of DOD, CIA, State, Commerce, FEMA, Treasury, CEA, and OMB in estimating U.S. wartime materials requirements and available supplies. All United States and other free world materials demands are considered and for the United States requirements are divided into direct defense, industrial, and essential civilian purposes. These estimates are prepared using the expertise, data, and experience of the involved agencies.

An increased DOD role is not required because under existing statutory provisions, that Department already participates fully through interagency forums in developing stockpile goals and approving stockpile acquisition and disposal plans. These interagency forums will continue to be essential in determining stockpile policies wherever stockpile management is located. In fact, the Department of Defense has opposed such a transfer of functions and responsibilities.

Mr. Chairman, that completes my prepared remarks. We would be pleased to address any questions you or other members of the subcommittee might have on the National Defense Stockpile Program and the modernization proposal. For this purpose, I would like to introduce the following representatives of the primary stockpile program agencies who are available to join me and serve as supporting witnesses: Dr. Thomas Moore, member of the Council of Economic Advisers; Mr. Richard Donnelly, Director of Industrial Resources, Department of Defense; Mr. J. Wayne Kulig, Assistant Commissioner for the National Defense Stockpile, General Services Administration; Dr. John Morgan, Chief Staff Officer of the Bureau of Mines in the Department of the Interior; and Mr. John Richards, Director, Office of Industrial Resource Administration, Department of Commerce.

Senator HUMPHREY. Thank you. Mr. Maguire.

As you know, the proposal has been greeted with some suspicion. It might be helpful to recount how this reevaluation came to be.

What initiated this whole train which has led us to this proposal?

Mr. MAGUIRE. The process began in 1983 under the auspices of the then Emergency Mobilization Preparedness Board [EMPB]. A study was commenced which was to review the then existing stockpile goals, review all the underlying assumptions and to formulate a set of stockpile goals that was the result of an interagency process.

Senator HUMPHREY. Who directed that that study should be undertaken in 1983?

Mr. MAGUIRE. Essentially the Emergency Mobilization Preparedness Board was under the auspices of the National Security Advisor and I believe at the time that was Judge Clark. He commenced the study and it was conducted, as I said, under the auspices of this Emergency Mobilization Preparedness Board.

Senator HUMPHREY. They reported when and to whom?

Mr. MAGUIRE. The remainder of the process was that we set up 10 separate study groups to analyze various aspects of the stockpile policy. It began with the wartime scenario analysis. There were analyses of the materials supply requirements, including shipping lane reliability, political reliability and international material supply requirements.

Also, there was an analysis of the finance side, the amount of energy that was available, the amount of industrial production that was presumed during this 3-year conventional conflict, and then a balanced analysis was done to look at the supply of materials and then to subtract from that the demand that would have come from the wartime requirements and derive from that the goals that would be required to assure ourselves that in a 3-year conventional conflict, sufficient materials are available to support all military, industrial and essential civilian needs.

Senator HUMPHREY. With regard to the genesis of the proposal, you are saying it started at NSC and that budgetary matters, deficit matters, were not an original impetus?

Mr. MAGUIRE. Mr. Chairman, I cannot testify about what the original thought was about the need for reevaluation of the stockpile.

I can testify that the EMPB did task the interagency group, it did a thorough analysis of the stockpile goals and looked at all the aspects involved in the goal-setting process.

Senator HUMPHREY. Was there any guidance accompanying that request, any guidance from NSC or from anyone else or was the Board completely at liberty to reach whatever conclusions it might?

Mr. **Maguire**. There was a steering committee set up under the EMPB to monitor the process, to review each of the analyses as it was completed, to submit comments and in this interagency forum to arrive at an agreement as to what each segment of the analysis would say.

That review process was, I believe, successful in getting all the comments out on the table and the agreements were reached and put in the form of each chapter of this 800-page report that I referred to.

At each step along the way this steering committee did make its comments and final conclusions were drawn, and I guess the ultimate product was obtained in February or March 1985 and the goals that were formulated were made public in the President's announcement of July 8, 1985.

Senator **Humphrey**. Let me see if I understand.

The National Security Council tasked the Emergency Mobilization Preparedness Board to undertake this study. As far as you know, there were no strings attached, no stipulations came from NSC?

Mr. **Maguire**. I sat on the steering committee, Mr. Chairman, and there were no strings and no stipulations of any kind, no constraints in our conducting a thorough analysis and coming out with some rational results.

Senator **Humphrey**. I want to understand the steering committee.

The steering committee is made up of members of the Board?

Mr. **Maguire**. Members of the interagency group.

Senator **Humphrey**. How does that differ from the Preparedness Board?

Mr. **Maguire**. The Emergency Mobilization Preparedness Board had some 12 to 14 working groups. Each one would be responsible for a different area of mobilization.

Senator **Humphrey**. Was that a standing body?

Mr. **Maguire**. No. It has gone out of existence. One of those working groups was chartered to conduct the stockpile study. The chairman of that stockpile working group was a member of the National Security Council and he conducted the process in meetings of the steering group.

Senator **Humphrey**. Was OMB involved in any of this officially or ex-officially?

Mr. **Maguire**. The Office of Management and Budget had a representative on the steering committee.

Senator **Humphrey**. What was the official function of the steering committee?

Mr. **Maguire**. The steering committee was to oversee the conduct of the entire analysis, to make sure that the interagency group got its comments into the process, and sought resolution and completion of the report in due time.

Senator **Humphrey**. What other agencies were represented on the steering committee?

Mr. **Maguire**. I would like to provide that information for the record, Mr. Chairman.

[The information follows:]

Eleven Agencies were represented on the steering committee: Central Intelligence Agency, Council of Economic Advisers, Department of Commerce, Department of Defense, Department of Energy, Department of the Interior, Department of State, Department of the Treasury, Federal Emergency Management Agency, General Services Administration, and the Office of Management and Budget.

Senator HUMPHREY. Approximately how many members were on the committee?

Mr. MAGUIRE. There were 12 agencies represented in the study. I would imagine each one of those 12 was represented on the steering committee.

Senator HUMPHREY. What I am trying to discover is whether the Preparedness Board was free to reach its own conclusions or were those conclusions tempered by the steering committee?

Mr. MAGUIRE. Mr. Chairman, in a study of this nature, I would have to say that we designated a lead agency that was responsible for each individual segment of the study.

As an example, we had one study that looked at the wartime scenario that was to be used to estimate the requirements and the materials supply during this 3-year conventional conflict. The Department of Defense headed that wartime scenario committee. They had expertise that was required to define the scenario.

Other members of the executive branch of Government made comments about the analysis that were helpful to the Department of Defense in formulating what the scenario assumptions were and what the final results were.

The Department of Defense made the final decision and made the final determination. With each of the various segments of the analysis that went on there was a lead agency designated and they had the predominant expertise in the area.

I would have to say there was no pressure put on the lead organization that was to put the analysis together to come up with their results. The final result, the final assessment of what the stockpile goals were, where the stockpile policy was finally put together, involved a cabinet-level discussion, and those discussions resulted in a Presidential decision that says these are the proposed stockpile goals.

Senator HUMPHREY. Cabinet level discussions? Did that discussion override in any significant way the recommendations of the Board?

Mr. MAGUIRE. I will have to claim, Mr. Chairman, I was not at that Cabinet-level discussion. At the meeting the President sought the advice and input of all Cabinet officers and a decision was made at the conclusion of that meeting.

Senator HUMPHREY. Have the recommendations of the Preparedness Board been made public?

Mr. MAGUIRE. I do not believe so.

Senator HUMPHREY. Just looking at the management of the stockpile on a historic, nonpartisan basis, would you agree or disagree that the stockpile has not been well managed under the present system.

Mr. MAGUIRE. I would disagree, Mr. Chairman.

Senator HUMPHREY. You do not have to elaborate. That is good enough because it will not do any good. I disagree with you. That is a dead end. You are a good soldier and there is no point pursuing that any further.

Mr. MAGUIRE. Mr. Chairman, I do not have the 43 years of experience of the previous witness. I am a relative newcomer in Government and I came to join a group of assembled experts who have been working in this area for a number of years. Many of them date back to the time—I have to point to John Morgan—back to the time when the stockpile was initially bought and put in place.

I think we have tried to bring together this expertise in a way that supersedes a lot of the prior assumptions that went into planning for the stockpile.

I would have to say that this type of expertise is very difficult to bring together to a consensus and it has been a pleasure to work with the kind of folks that are available.

Senator HUMPHREY. I have no doubt, but that is not really relevant.

Why should not Congress take over the responsibility for setting these stockpile goals?

Mr. MAGUIRE. Mr. Chairman, the administration has responsibility for planning for mobilization. As the Commander-in-Chief, the President has responsibility to tie together military, essentially civilian and industrial needs for mobilization periods.

I believe that the interagency process that has been used is the best way to formulate total plans for mobilization, for the 3-year conventional conflict.

I do not believe that the expertise from the administration and from the various executive agencies can be overlooked in formulating goals for the strategic stockpile.

Senator HUMPHREY. We will have a number of written questions.

Will you assure me that you or your staff can provide us answers within 10 working days? We need them for the markup of the bill.

Mr. MAGUIRE. Senator Humphrey, you have my assurance that we will submit our responses within 10 working days.

Senator, could I clarify an earlier question concerning titanium, chromium, and manganese?

It was intimated that the stockpile would not be prepared to support mobilization needs with respect to these three materials. I would like to clarify the current goals for chromium: 200,000 short tons with a supplemental reserve of 594,000 short tons of chromium in the stockpile.

With regard to titanium, there are 3,900 short tons of titanium in the stockpile goals and 21,000 short tons in the supplemental reserve.

And with regard to manganese, there are 870,000 short tons of manganese in the supplemental reserve.

Senator HUMPHREY. All right.

I will insert the prepared statement by David A. Hartquist and Robert L. Meuser for the hearing record at this point.

[The prepared statement referred to follows:]

PREPARED STATEMENT BY DAVID HARTQUIST AND ROBERT MEUSER

RE: PROPOSAL TO SELL COBALT FROM THE STRAGEGIC MATERIALS STOCKPILE

Mr. Chairman: The purpose of this letter is to submit, on behalf of the Specialty Steel Industry of the United States, comments for the record regarding the recent proposal to sell cobalt from the strategic materials stockpile. The Specialty Steel Industry of the United States is an association of U.S. producers of specialty steels—including nickel/cobalt superalloys—incorporated in the District of Columbia.

The Specialty Steel Industry believes that, in light of recent GSA acquisitions of Grade A/B cobalt cathode, it is now prudent to sell some of the pre-1957 cobalt granules and nodules in the stockpile. Metallurgical advances since the early 1950s have rendered the cobalt granules and nodules largely irrelevant to the production of superalloys for national security applications. The sale of this poorer quality cobalt to make room for higher quality cathodic cobalt would greatly improve the stockpile and its utility.

The National Stockpile Policy and its method of implementation can significantly influence our nation's vulnerability to economic warfare as well as determine its success in actual warfare. Although the Specialty Steel Industry does not object in principle to the sale of materials from the stockpile, the formulation of national stockpile policy and modifications to stockpile levels must acknowledge national security imperatives and the quality levels of material in the stockpile as well as budgetary and other considerations.

A review of the uses and sources of certain materials essential to specialty steel production demonstrates both their importance to national security and the need to ensure adequate reserves for periods of national emergency. Chromium, cobalt, columbium and manganese, for example, are alloying agents—largely without effective substitutes in the short term—used in the production of metals which are in turn used in an endless array of military and essential civilian applications. As you know, the major reserves of these materials are located generally in unstable regions of the world.

Cobalt, for example, is generally found associated with nickel or copper deposits and is produced as a by-product. Zaire and Zambia are currently the largest producers in the world, with some additional mine production also emanating from Australia, Canada, Cuba, Finland and the Soviet Union. U.S. deposits of cobalt are negligible and are not economical to produce at current world price levels.

It is important to note that the quality and form of the materials in the stockpile can be as important as the quantity. We know that the cobalt presently in the stockpile is not of sufficient quality of aerospace applications, except for the recent purchases after 1981. Additionally, the form determines the potential applications and flexibility of material in the stockpile. If a material is in a form that requires processing before it can be utilized in its security applications, the materials contained in the stockpile are naturally of lesser utility, especially during the first year of a conflict.

The cobalt granules and nodules currently in the stockpile were purchased prior to 1957 as a result of increasing aerospace needs revealed by the Korean War. Prior to 1957, the state of metallurgy prevented even the measurement—let alone the elimination—of many impurities in the cobalt. The pre-1957 cobalt granules and nodules presently in the stockpile can still be used in general civilian applications, but now have limited utility in aerospace applications.

As a consequence, the Specialty Steel Industry strongly urged the recent acquisitions of Grade A and Grade B cathodic cobalt. The Specialty Steel Industry agrees that these recent purchases now make it prudent to start selling the poorer quality cobalt granules and nodules. Given present stockpile quantities versus estimated wartime needs, the Specialty Steel Industry believes that additional purchases of Grade A or Grade B cathodic cobalt should be made, but need only amount to one-half of the quantity of cobalt nodules or granules to be sold.

For these reasons, the Specialty Steel Industry urges that any cobalt sold from the stockpile be confined to pre-1957 material. The more recently acquired and/or better quality material must be retained and additional purchases are recommended to provide a final mix of two-thirds higher and one-third lower quality cobalt in the stockpile.

On behalf of the Specialty Steel Industry of the United States, we appreciate this opportunity to comment on the implementation of the National Stockpile Policy. The Specialty Steel Industry stands ready to respond to any questions or to assist in the formulation and implementation of the National Stockpile Policy.

Senator HUMPHREY. We are now going to go into closed session. I ask everyone who does not have security clearances to leave the room at this time.

[Whereupon, at 11:15 a.m., the subcommittee proceeded in executive session.]

EXECUTIVE SESSION

The subcommittee met in executive session, pursuant to other business, at 11:18 a.m., in room SR-222, Russell Senate Office Building, Senator Gordon J. Humphrey (chairman) presiding.

Present: Senator Humphrey.

Staff present: Ronald P. Kelly and David S. Lyles, professional staff members; Inga B. Schoonover, staff assistant.

Also present: Allan W. Cameron, assistant to Senator Denton, and Alan Ptak, assistant to Senator Gramm.

Senator HUMPHREY. Let us come to order.

Those who are leaving are asked to leave right away, please, so that we can get on.

Mr. Maguire, are you taking responsibility for all the people here with you?

Mr. MAGUIRE. Yes, Mr. Chairman.

Let me introduce the folks at the table.

Senator HUMPHREY. What I meant is that we want to be sure everyone here has clearance, the people who came with you under your responsibility. There is no one here who is not with you; is that right?

Mr. MAGUIRE. Let me confirm that.

Sir, I can verify that the people in the audience are clear and also along the wall here.

Senator HUMPHREY. Do you have classified testimony you want to present?

Mr. MAGUIRE. Yes, sir. If I may, Senator, similar to our earlier session, submit my written statement for the record and I will summarize my remarks here.

Senator HUMPHREY. I did not mean to keep you from introducing your assistants. Go ahead.

Mr. MAGUIRE. Let me introduce the former Acting Chairman of the Council of Economic Advisors, Hon. Tom Moore; Dr. Warren Farb, Department of Commerce; Dr. John Morgan, Department of the Interior; and along the wall Capt. Ralph Buck, who will be submitting testimony here, and David Tarbell from the Department of Defense.

There are other members of the administration here who are prepared to respond to your questions.

Senator HUMPHREY. Fine.

Mr. MAGUIRE. As I stated in the earlier session, the study of the national stockpile goals began in 1983. It consisted of 12 agencies. We formed ourselves into 10 subgroups under the leadership of various departments and agencies to formulate the overall stockpile goals.

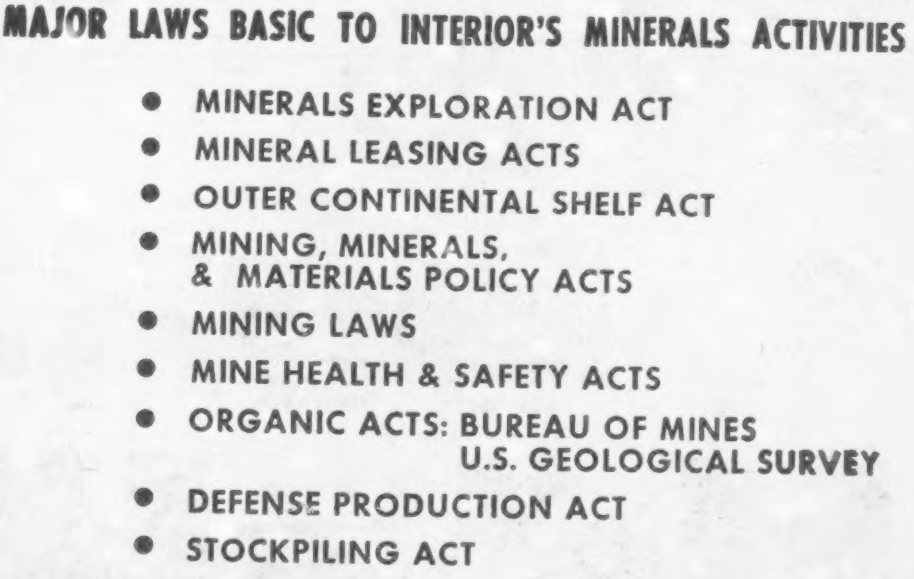
[Deleted.]

To give you an idea of the pieces that are put together in this overall analysis, I would like to ask Dr. John Morgan from the Department of the Interior to demonstrate the international supply estimates that were performed under the auspices of the Department of the Interior.

STATEMENT OF DR. JOHN D. MORGAN, JR., CHIEF STAFF OFFICER, BUREAU OF MINES, DEPARTMENT OF THE INTERIOR

Dr. MORGAN. Mr. Chairman, we believe a picture or two is worth a pile of words. I have a lot of pictures here and I will flash them quickly, if I may.

In the first place, the Department of the Interior chaired a committee that pulled together State, Commerce, Federal Emergency Management Agency, GSA, CIA, and Defense so that the data was reviewed by this interagency committee.



MAJOR LAWS BASIC TO INTERIOR'S MINERALS ACTIVITIES

- MINERALS EXPLORATION ACT
- MINERAL LEASING ACTS
- OUTER CONTINENTAL SHELF ACT
- MINING, MINERALS, & MATERIALS POLICY ACTS
- MINING LAWS
- MINE HEALTH & SAFETY ACTS
- ORGANIC ACTS: BUREAU OF MINES
  U.S. GEOLOGICAL SURVEY
- DEFENSE PRODUCTION ACT
- STOCKPILING ACT

It was not exclusively Interior information. On the other hand, I would like to point out that the Secretary of the Interior has been at this sort of thing ever since 1849, the Geological Survey since 1879, my own particular Bureau since 1910, and we are responding over and over from World War I, World War II, Korean war, Vietnam war, to the present time to this type of information.

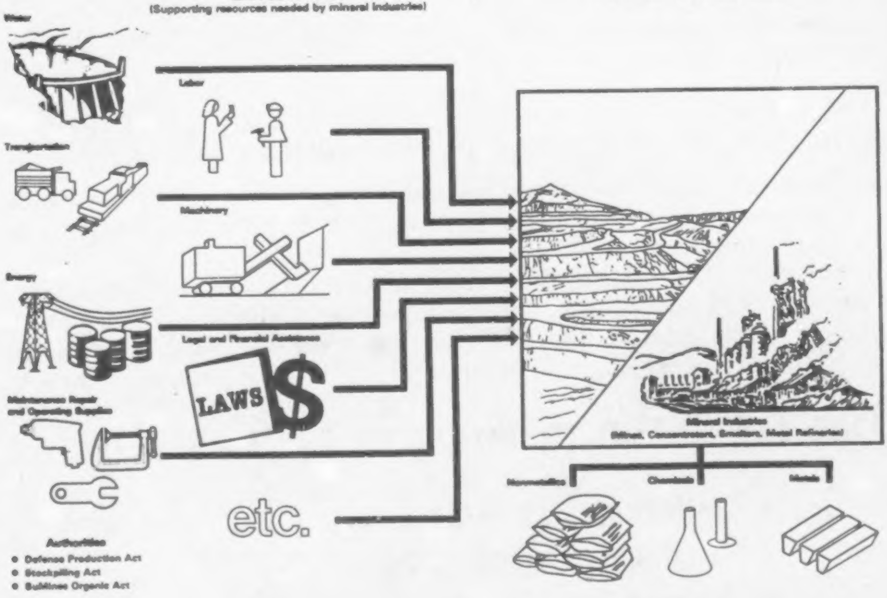
We are responsible for the mining industry under the Defense Production Act and Stockpiling Act.

Mr. Chairman, I would like to point out that the Defense Production Act, which is critical to this entire process, expires September 30, 1986. We hope that it will be renewed.

In Defense Emergencies

EMERGENCY MINERALS ADMINISTRATION (EMA)

(with Bureau of Mines as Nucleus) assists in obtaining supporting resources for non fuel mineral industries and allocates as necessary their mineral products. Bureau of Mines continually monitors worldwide supply/demand and has technical competence and field installations.


EMA CLAIMANCY
(Supporting resources needed by mineral industries)
EMA RESOURCE ALLOCATIONS
Water
Labor
Transportation
Machinery
Energy
Legal and Financial Assistance
LAWS
$
Maintenance Repair and Operating Supplies
etc.
Mineral Industries
(Mines, Concentrators, Smelters, Metal Refineries)
Nonmetallics
Chemicals
Metals

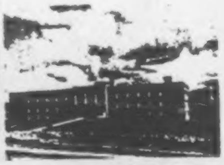
Authorities
- Defense Production Act
- Stockpiling Act
- BuMines Organic Act

BUREAU OF MINES RESEARCH FACILITIES

2,400 employees
$128 million budget

WASHINGTON

PENNSYLVANIA

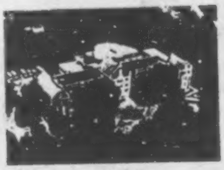


NEVADA

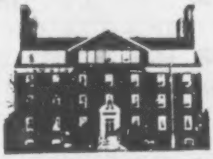
COLORADO

ALASKA

UTAH

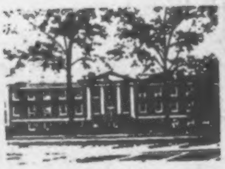


MARYLAND

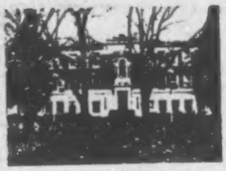


MISSOURI

MINNESOTA



ALABAMA



OREGON

The Secretary of the Interior maintains contact with industry and maintains the Emergency Minerals Administration, which brings together people in this country. We have continued input from industry in our operation. We are not just a bunch of bureaucrats sitting in town. We have field offices all over the country that have been examining the resources of the United States and the foreign countries for many, many years.

Extracts dealing with the Bureau of Mines
United States Code Annotated (U. S. C. A.)
Title 30 - Mineral Lands and Mining

§ 1. Bureau of Mines; establishment; director; experts and other employees

There is hereby established in the Department of the Interior a bureau of mining, metallurgy, and mineral technology, to be designated the Bureau of Mines, and there shall be a director of said bureau, who shall be thoroughly equipped for the duties of said office by technical education and experience and who shall be appointed by the President, by and with the advice and consent of the Senate; and there shall also be in the said bureau such experts and other employees, to be appointed by the Secretary of the Interior, as may be required to carry out the purposes of sections 1, 3, and 5 to 7 of this title in accordance with the appropriations made from time to time by Congress for such purposes.

May 16, 1910, c. 240, § 1, 36 Stat. 369; Feb. 25, 1913, c. 72, § 1, 37 Stat. 681; Ex.Ord.No.4239, June 4, 1925; Ex.Ord.No.6611, Feb. 22, 1934.

§ 1a. Same; transfer of activities, employees, records, etc., from Bureau of Foreign and Domestic Commerce

There is hereby transferred from the Department of Commerce, Bureau of Foreign and Domestic Commerce, to the Department of the Interior, Bureau of Mines, all those activities of the Minerals Division of the Bureau of Foreign and Domestic Commerce concerned with economic and statistical analyses of mineral commodities, domestic and foreign, together with all employees, records, files, equipment, publications, and funds pertaining thereto, effective immediately.

May 9, 1935, c. 101, § 1, 49 Stat. 205.

§ 3. Same; duties of Bureau of Mines

It shall be the province and duty of the Bureau of Mines, subject to the approval of the Secretary of the Interior, to conduct inquiries and scientific and technologic investigations concerning mining, and the preparation, treatment, and utilization of mineral substances with a view to improving health conditions, and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries; to investigate explosives and peat; and on behalf of the Government to investigate the mineral fuels and unfinished mineral products belonging to, or for the use of, the United States, with a view to their most efficient mining, preparation, treatment, and use; and to disseminate information concerning these subjects in such manner as will best carry out the purposes of the provisions of sections 1, 3, and 5 to 7 of this title.

May 16, 1910, c. 240, § 2, 36 Stat. 370; Feb. 25, 1913, c. 72, 37 Stat. 681; Ex.Ord.No.4239, June 4, 1925; Ex.Ord.No.6611, Feb. 22, 1934.

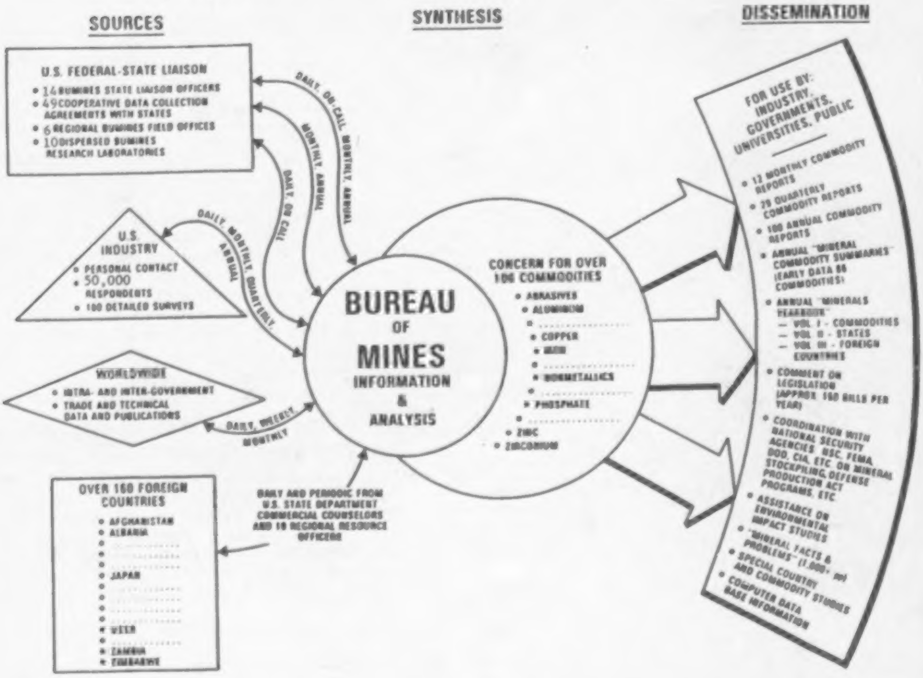
§ 5. Reports of investigations

The Director of the Bureau of Mines shall prepare and publish, subject to the direction of the Secretary of the Interior, under the appropriations made from time to time by Congress, reports of inquiries and investigations, with appropriate recommendations of the bureau, concerning the nature, causes, and prevention of accidents, and the improvement of conditions, methods, and equipment, with special reference to health, safety, and prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; the use of explosives and electricity, safety methods and appliances, and rescue and first-aid work in said industries; the causes and prevention of mine fires; and other subjects included under the provisions of sections 1, 3, and 5 to 7 of this title.

May 16, 1910, c. 240, § 3, 36 Stat. 370; Feb. 25, 1913, c. 72, 37 Stat. 681; Ex.Ord.No.4239, June 4, 1925; Ex.Ord.No.6611, Feb. 22, 1934.

Under the Organic Act of the Bureau of Mines in 1910 we have been at this sort of thing and in 1935 they transferred to the Interior Department the international mineral activities of the Commerce Department.

WORLD-WIDE MINERAL INFORMATION


SOURCES
SYNTHESIS
DISSEMINATION
U.S. FEDERAL-STATE LIAISON
• 14 BUMINES STATE LIAISON OFFICERS
• 49 COOPERATIVE DATA COLLECTION AGREEMENTS WITH STATES
• 6 REGIONAL BUMINES FIELD OFFICES
• 10 DISPERSED BUMINES RESEARCH LABORATORIES
DAILY, ON-CALL, MONTHLY, ANNUAL
MONTHLY, ANNUAL
DAILY, ON CALL
U.S. INDUSTRY
• PERSONAL CONTACT
• 50,000 RESPONDENTS
• 100 DETAILED SURVEYS
DAILY, MONTHLY, QUARTERLY, ANNUAL
WORLDWIDE
• INTRA- AND INTER-GOVERNMENT
• TRADE AND TECHNICAL DATA AND PUBLICATIONS
DAILY, WEEKLY, MONTHLY
OVER 160 FOREIGN COUNTRIES
• AFGHANISTAN
• ALBANIA
• JAPAN
• USSR
• ZAMBIA
• ZIMBABWE
DAILY AND PERIODIC FROM U.S. STATE DEPARTMENT COMMERCIAL COUNSELORS AND 10 REGIONAL RESOURCE OFFICERS
BUREAU OF MINES INFORMATION & ANALYSIS
CONCERN FOR OVER 100 COMMODITIES
• ABRASIVES
• ALUMINUM
• COPPER
• IRON
• NONMETALLICS
• PHOSPHATE
• ZINC
• ZIRCONIUM
FOR USE BY: INDUSTRY, GOVERNMENTS, UNIVERSITIES, PUBLIC
• 12 MONTHLY COMMODITY REPORTS
• 29 QUARTERLY COMMODITY REPORTS
• 100 ANNUAL COMMODITY REPORTS
• ANNUAL "MINERAL COMMODITY SUMMARIES" (EARLY DATA 88 COMMODITIES)
• ANNUAL "MINERALS YEARBOOK"
— VOL I - COMMODITIES
— VOL II - STATES
— VOL III - FOREIGN COUNTRIES
• COMMENT ON LEGISLATION (APPROX 150 BILLS PER YEAR)
• COORDINATION WITH NATIONAL SECURITY AGENCIES NSC, FEMA, DOD, CIA, ETC. ON MINERAL STOCKPILING, DEFENSE PRODUCTION ACT PROGRAMS, ETC
• ASSISTANCE ON ENVIRONMENTAL IMPACT STUDIES
• "MINERAL FACTS & PROBLEMS" (1,000+ pp)
• SPECIAL COUNTRY AND COMMODITY STUDIES
• COMPUTER DATA BASE INFORMATION

So, we have been looking at the international field, even if we had not looked at it before, as a result of law ever since 1935.

There has been criticism that there was not much industry input into this study. However, we are in touch with 50,000 firms that report regularly to the Bureau of Mines on a company-confidential basis. We collect all of the information from the States on minerals and share it with them on a company-confidential basis.

In every one of the 160 foreign countries, commerical attachés on the State Department staff or regional resource attachés report to the Bureau of Mines on what is going on in minerals all over the world.

All of this information comes in to the Bureau and we put out a draft of data for comment which was reviewed by all of the different agencies that I mentioned before it went into the study.

81 STOCKPILE ITEMS
ARE MINERAL MATERIALS

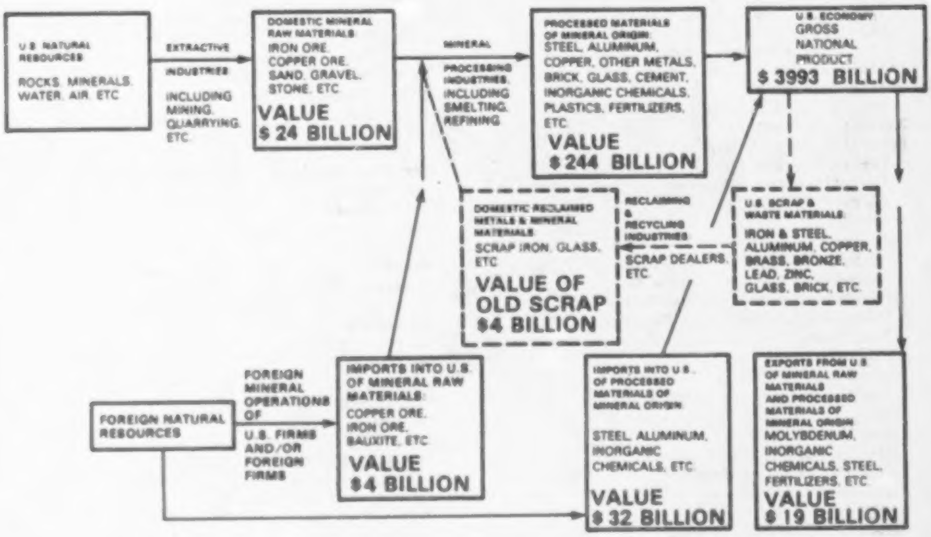
(agricultural items deleted)

Aluminum Metal Group
  (Alumina)
  (Aluminum)
  (Bauxite, Metal Grade, Jamaica Type)
  (Bauxite, Metal Grade, Surinam Type)
Aluminum Oxide, Abrasive Grain Group
  (Aluminum Oxide, Abrasive Grain)
  (Aluminum Oxide, Fused, Crude)
  (Bauxite, Abrasive Grade)
Antimony
Asbestos, Amosite
Asbestos, Chrysotile
Bauxite, Refractory
Beryllium Metal Group
  (Beryl Ore 11% BeO)
  (Beryllium Copper Master Alloy)
  (Beryllium Metal)
Bismuth
Cadmium
Chromium, Chemical & Metallurgical Group
  (Chromite, Chemical Grade Ore)
  (Chromite, Metallurgical Grade Ore)
  (Chromium, Ferro, High Carbon)
  (Chromium, Ferro, Low Carbon)
  (Chromium, Ferro, Silicon)
  (Chromium, Metal)
Chromite, Refractory Grade Ore
Cobalt
Columbium Group
  (Columbium Carbide Powder)
  (Columbium Concentrates)
  (Columbium, Ferro)
  (Columbium, Metal)
Copper
~~Cordage Fibers, Abaca~~
~~Cordage Fibers, Sisal~~
Diamond, Industrial Group
  (Diamond Dies, Small)
  (Diamond, Industrial, Crushing Bort)
  (Diamond, Industrial, Stones)
Fluorspar, Acid Grade
Fluorspar, Metallurgical Grade
Germanium
Graphite, Natural - Ceylon, Amorphous Lump
Graphite, Natural - Malagasy, Crystalline
Graphite, Natural - Other than Ceylon & Malagasy
Iodine
Jewel Bearings
Lead
Manganese Dioxide, Battery Grade Group
  (Manganese, Battery Grade, Natural Ore)
  (Manganese, Battery Grade, Synthetic Dioxide)
Manganese, Chemical & Metallurgical Group
  (Manganese Ore, Chemical Grade)
  (Manganese Ore, Metallurgical Grade)
  (Manganese, Ferro, High Carbon)
  (Manganese, Ferro, Low Carbon)
  (Manganese, Ferro, Medium Carbon)
  (Manganese, Ferro, Silicon)
  (Manganese, Metal, Electrolytic)
Mercury
Mica, Muscovite, Block, Stained & Better
Mica, Muscovite Film, 1st & 2nd Qualities
Mica, Muscovite Splittings
Mica, Phlogopite Block
Mica, Phlogopite Splittings
Molybdenum Group
  (Molybdenum Disulphide)
  (Molybdenum, Ferro)
~~Morphine Sulphate and Related Analgesics~~
  ~~(Crude)~~
  ~~(Refined)~~
~~Natural Insulation Fibers~~
Nickel
Platinum Group Metals, Iridium
Platinum Group Metals, Palladium
Platinum Group Metals, Platinum
~~Pyrethrum~~
Quartz Crystals
~~Quinidine~~
~~Quinine~~
~~Ricinoleic/Sebacic Acid Products~~
~~Rubber~~
Rutile
Sapphire & Ruby
Silicon Carbide, Crude
Silver (fine)
Talc, Steatite Block & Lump
Tantalum Group
  (Tantalum Carbide Powder)
  (Tantalum Metal)
  (Tantalum Minerals)
Thorium Nitrate
Tin
Titanium Sponge
Tungsten Group
  (Tungsten Carbide Powder)
  (Tungsten, Ferro)
  (Tungsten Metal Powder)
  (Tungsten Ores & Concentrates)
Vanadium Group
  (Vanadium, Ferro)
  (Vanadium Pentoxide)
~~Vegetable Tannin Extract, Chestnut~~
~~Vegetable Tannin Extract, Quebracho~~
~~Vegetable Tannin Extract, Wattle~~
Zinc

I should like to point out, sir, that there are 94 strategic and critical materials. Eighty-one are mineral materials and hence under the primary jurisdiction of the Secretary of the Interior.

THE ROLE OF NONFUEL MINERALS IN THE U.S. ECONOMY

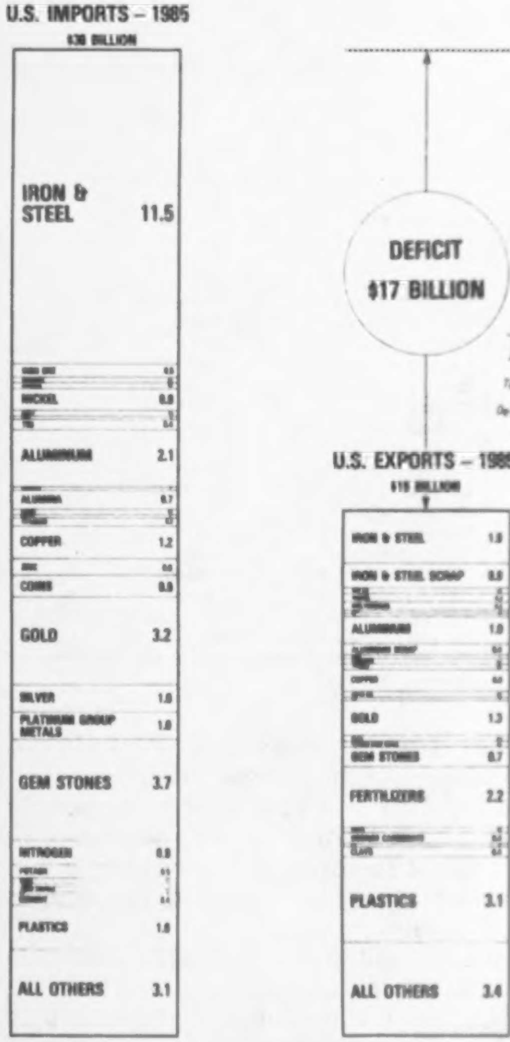
(ESTIMATED VALUES FOR 1985)

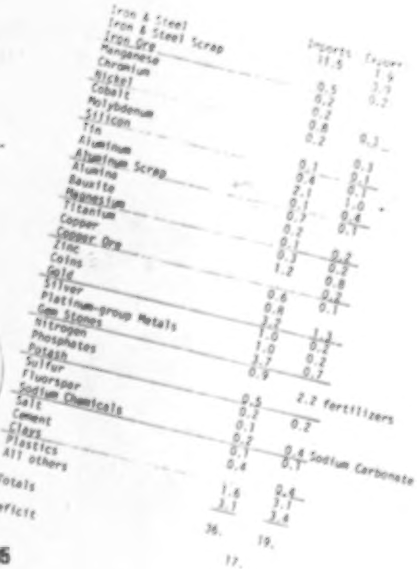

U.S. NATURAL RESOURCES
ROCKS, MINERALS, WATER, AIR, ETC.
EXTRACTIVE INDUSTRIES
INCLUDING MINING, QUARRYING, ETC.
DOMESTIC MINERAL RAW MATERIALS:
IRON ORE, COPPER ORE, SAND, GRAVEL, STONE, ETC.
VALUE $ 24 BILLION
MINERAL PROCESSING INDUSTRIES, INCLUDING SMELTING, REFINING
PROCESSED MATERIALS OF MINERAL ORIGIN:
STEEL, ALUMINUM, COPPER, OTHER METALS, BRICK, GLASS, CEMENT, INORGANIC CHEMICALS, PLASTICS, FERTILIZERS, ETC.
VALUE $ 244 BILLION
U.S. ECONOMY
GROSS NATIONAL PRODUCT
$ 3993 BILLION
DOMESTIC RECLAIMED METALS & MINERAL MATERIALS:
SCRAP IRON, GLASS, ETC.
VALUE OF OLD SCRAP $4 BILLION
RECLAIMING & RECYCLING INDUSTRIES
SCRAP DEALERS, ETC.
U.S. SCRAP & WASTE MATERIALS:
IRON & STEEL, ALUMINUM, COPPER, BRASS, BRONZE, LEAD, ZINC, GLASS, BRICK, ETC.
FOREIGN NATURAL RESOURCES
FOREIGN MINERAL OPERATIONS OF U.S. FIRMS AND/OR FOREIGN FIRMS
IMPORTS INTO U.S. OF MINERAL RAW MATERIALS:
COPPER ORE, IRON ORE, BAUXITE, ETC.
VALUE $4 BILLION
IMPORTS INTO U.S. OF PROCESSED MATERIALS OF MINERAL ORIGIN:
STEEL, ALUMINUM, INORGANIC CHEMICALS, ETC.
VALUE $ 32 BILLION
EXPORTS FROM U.S. OF MINERAL RAW MATERIALS AND PROCESSED MATERIALS OF MINERAL ORIGIN:
MOLYBDENUM, INORGANIC CHEMICALS, STEEL, FERTILIZERS, ETC.
VALUE $ 19 BILLION

BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR
(based in part on U.S. Department of Commerce data)

We followed these materials and the study followed them. Domestic raw mineral materials produced in this country in 1985, were valved at $24 billion, value added by the manufacturing brings it up to $244 billion, about a 10-fold increase in the process.

Imports of raw mineral materials were valued at $4 billion, imports of processed materials valued at $32 billion. We have figures on recycling of old scrap and we have the information on exports of materials from the United States as well.




Iron & Steel
Iron & Steel Scrap
Iron Ore
Manganese
Chromium
Nickel
Cobalt
Molybdenum
Silicon
Tin
Aluminum
Aluminum Scrap
Alumina
Bauxite
Magnesium
Titanium
Copper
Copper Ore
Zinc
Coins
Gold
Silver
Platinum-group Metals
Gem Stones
Nitrogen
Phosphates
Potash
Sulfur
Fluorspar
Sodium Chemicals
Salt
Cement
Clays
Plastics
All others

Totals

Deficit

Imports
11.5
0.5
0.2
0.2
0.8
0.2
0.1
0.6
2.1
0.1
0.7
0.2
0.1
0.3
1.2
0.6
0.8
3.2
1.0
1.0
3.7
0.9
0.5
0.2
0.1
0.2
0.1
0.4
1.6
3.1
36.

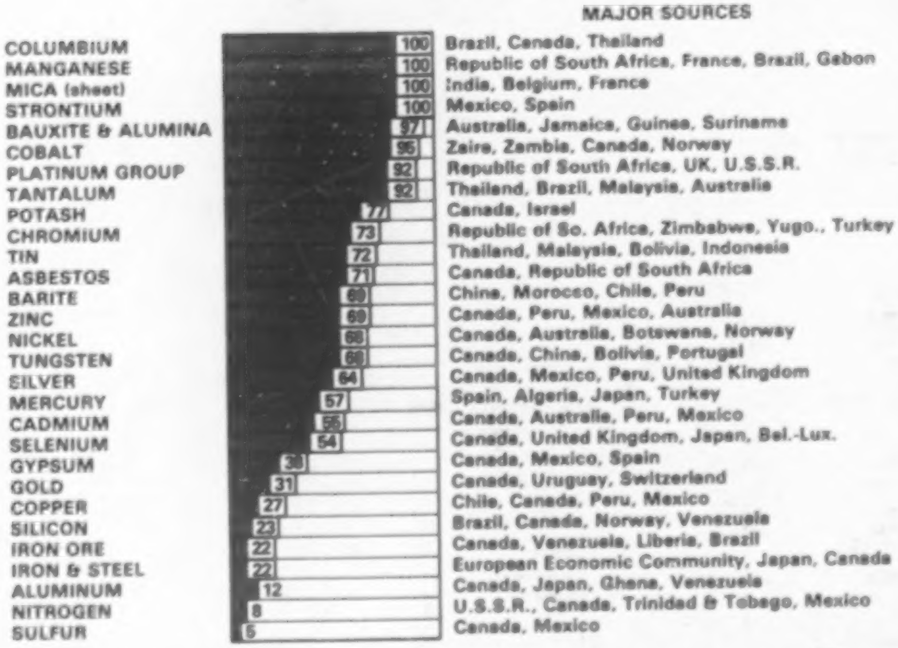
Exports
1.9
3.3
0.2
0.3
0.3
0.1
0.1
1.0
0.4
0.1
0.2
0.2
0.8
0.2
0.1
1.3
0.2
0.2
0.7
2.2 Fertilizers
0.2
0.4 Sodium Carbonate
0.1
0.4
3.1
3.4
19.

17.

We follow these not just on a dollar basis, but we watch all the time the deficit in our balance of trade. In this last year where the merchandise balance of trade was $149 billion out of the black, we know that these mineral commodities accounted for $17 billion of the negative balance in this area.

1985 NET IMPORT RELIANCE
SELECTED NONFUEL MINERAL MATERIALS

U.S.A.

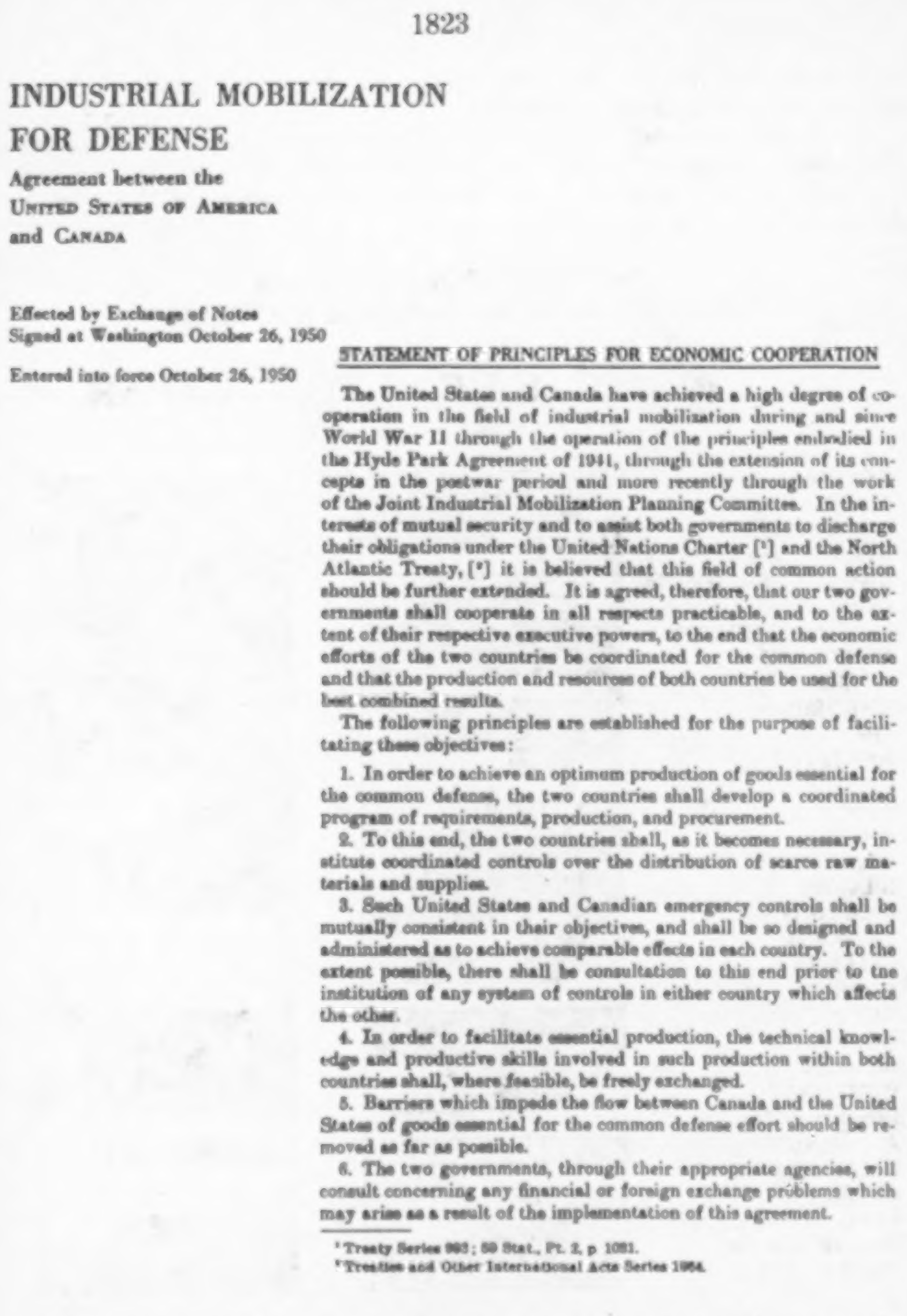


We followed them, not just on a dollar basis, but we followed them on the strategic basis and where do they come from.

If I could, Mr. Chairman, I should like to call your attention to an important item on this chart which I think is very germane to the formulas that you are being asked to consider. I would like you to know that in the first or second place, in almost every one of these, the source of imports is Canada.

Canada is one of the major suppliers of these strategic materials to the United States. That is particularly important because in 1950, October 26, 1950, the Canadian Government at the time of the Korean war, and the U.S. Government agreed to a statement of mutual cooperation for industrial mobilization that says:

> Our two Governments shall cooperate in all respects practicable, and to the extent of their respective executive powers, to the end that the economic efforts of the two countries be coordinated for the common defense and that the production and resources of both countries be used for the best combined results.



1823

INDUSTRIAL MOBILIZATION FOR DEFENSE

Agreement between the
UNITED STATES OF AMERICA
and CANADA

Effected by Exchange of Notes
Signed at Washington October 26, 1950

Entered into force October 26, 1950

STATEMENT OF PRINCIPLES FOR ECONOMIC COOPERATION

The United States and Canada have achieved a high degree of cooperation in the field of industrial mobilization during and since World War II through the operation of the principles embodied in the Hyde Park Agreement of 1941, through the extension of its concepts in the postwar period and more recently through the work of the Joint Industrial Mobilization Planning Committee. In the interests of mutual security and to assist both governments to discharge their obligations under the United Nations Charter [1] and the North Atlantic Treaty, [2] it is believed that this field of common action should be further extended. It is agreed, therefore, that our two governments shall cooperate in all respects practicable, and to the extent of their respective executive powers, to the end that the economic efforts of the two countries be coordinated for the common defense and that the production and resources of both countries be used for the best combined results.

The following principles are established for the purpose of facilitating these objectives:

1. In order to achieve an optimum production of goods essential for the common defense, the two countries shall develop a coordinated program of requirements, production, and procurement.
2. To this end, the two countries shall, as it becomes necessary, institute coordinated controls over the distribution of scarce raw materials and supplies.
3. Such United States and Canadian emergency controls shall be mutually consistent in their objectives, and shall be so designed and administered as to achieve comparable effects in each country. To the extent possible, there shall be consultation to this end prior to the institution of any system of controls in either country which affects the other.
4. In order to facilitate essential production, the technical knowledge and productive skills involved in such production within both countries shall, where feasible, be freely exchanged.
5. Barriers which impede the flow between Canada and the United States of goods essential for the common defense effort should be removed as far as possible.
6. The two governments, through their appropriate agencies, will consult concerning any financial or foreign exchange problems which may arise as a result of the implementation of this agreement.

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[1] Treaty Series 993; 59 Stat., Pt. 2, p. 1031.

[2] Treaties and Other International Acts Series 1964.

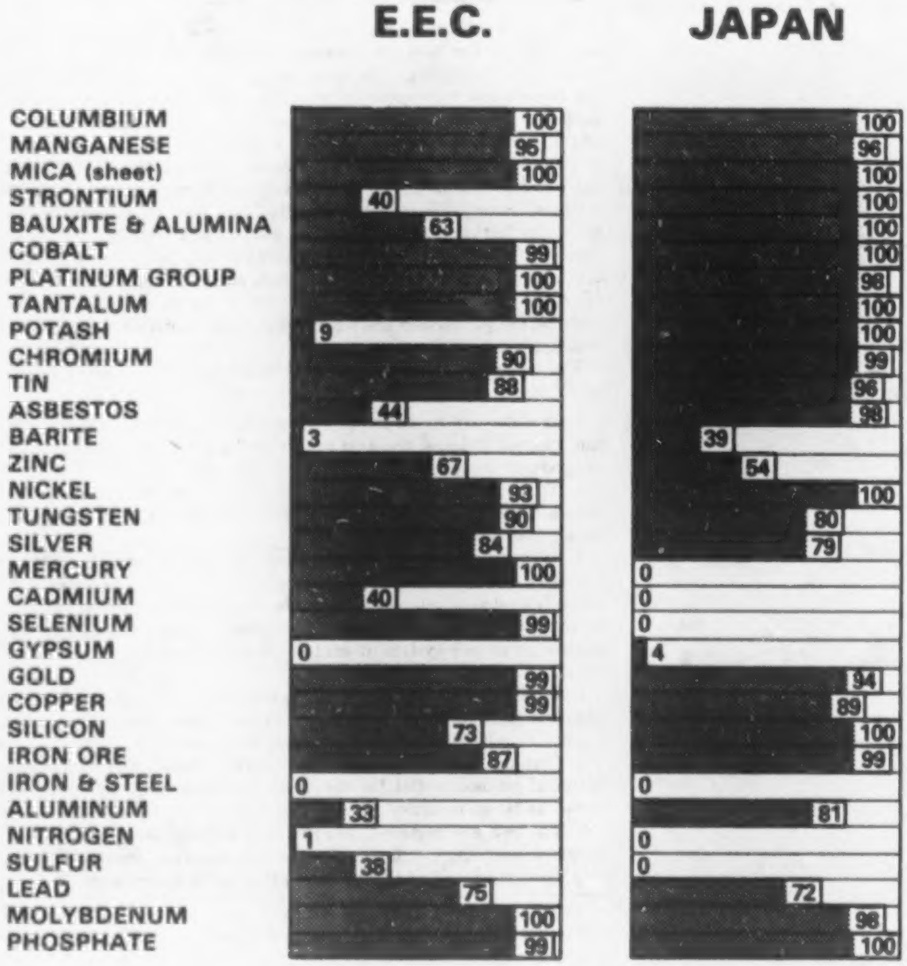
This document, this treaty, is still in effect. It has been reaffirmed by President Reagan and Prime Minister Monroney. We had meetings in Ottawa in October. I believe there was a meeting between the Defense Department in the Rocky Island Arsenal in April on which the Canadian people are working on a day-to-day basis with us.

In the Interior Department we are working on a day-to-day basis with our Canadian counterparts and Canadian Energy, Mines, and

Minerals. We follow not only United States and Canada, but we follow every country in the world.

Here, for example, we are aware of the import dependence of the European community that we are allied with. We are aware and the committee was aware and the study was aware of the import dependence of Japan.

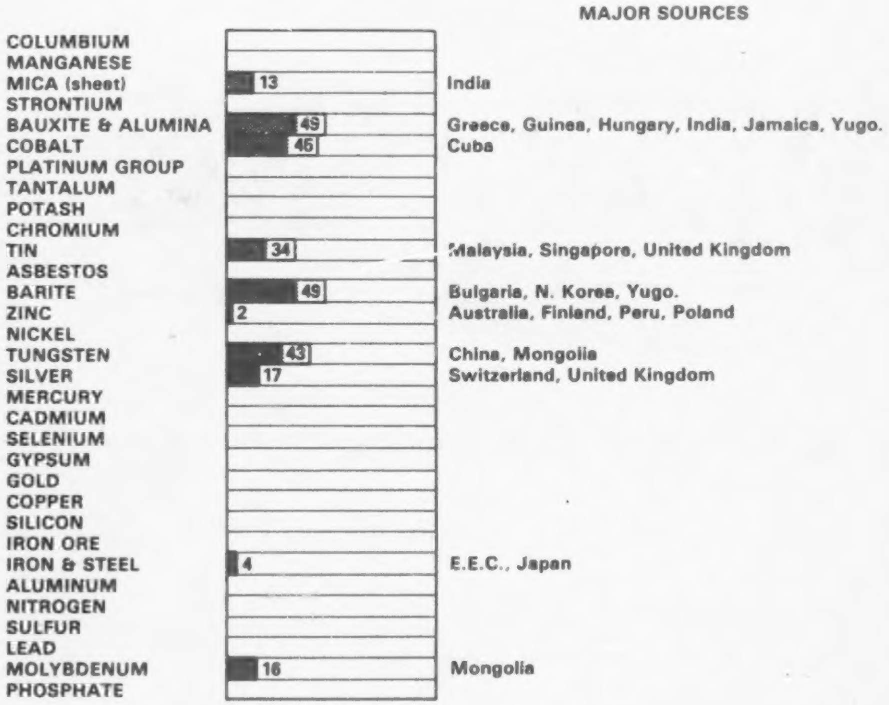
1984 NET IMPORT RELIANCE SELECTED NONFUEL MINERAL MATERIALS



USBuMines

1985 NET IMPORT RELIANCE
SELECTED NONFUEL MINERAL MATERIALS

U.S.S.R.

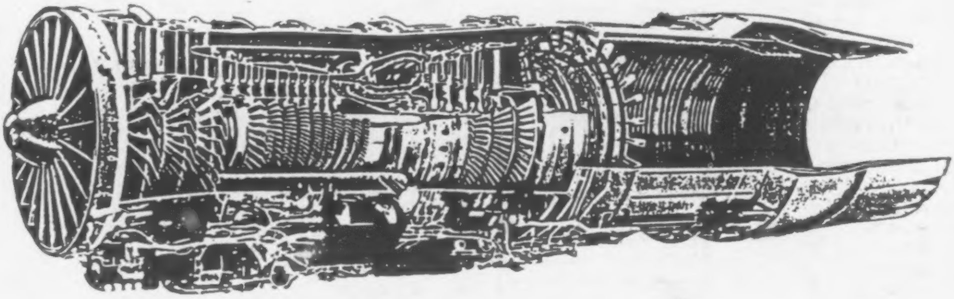


USBuMines

We also follow the Soviet Union. It is interesting to point out that the Soviet Union is essentially self-sufficient in these materials. Where they do import, it is usually from countries under their direct control.

Notice, for example, they import a substantial amount of cobalt. Cuba is the supplier, not Zaire, Zambia, to any extent. That is one of the reasons we are interested in Cuba.

We work on a day-to-day basis with the Defense Department, Commerce Department and other people on the uses of these matierials.



Input Weight Requirements for the Pratt & Whitney F100 Turbofan Engine (1983)

Titanium	5479 lb
Nickel	4597 lb
Chromium	1537 lb
Cobalt	886 lb
Aluminum	715 lb
Columbium	163 lb
Tantalum	3 lb

(2 F100s on F-15 fighter and 1 F100 on F-16)

Here is an F-100 jet engine which powers the F-15 and F-16 aircraft. It requires 2½ tons of titanium, but I would like to point out, sir, if I may, with respect to some of the earlier testimony I heard today, as far as the titanium is concerned, the United States is self-sufficient. We do not import any significant quantities of titanium metal. In fact, we export more titanium scrap metal than we import as a metal.

There is a confusion about titanium raw materials, ilmenite, and rutile which we can also be self-sufficient in. Our titanium industry in this country is running at only two-thirds of capacity at the present time. The capacity is about 33,000 tons and they are running about 20,000 tons and it is a depressed industry.

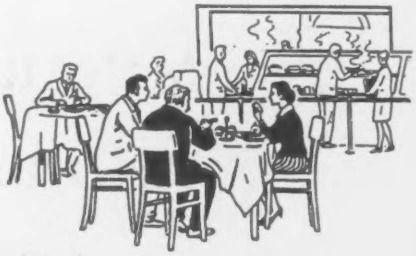
We have excess titanium. The jet engine also uses nickle, chromium, cobalt, and tantalum. We are aware of those uses. We are also aware of uses in the essential industry.

[Chart deleted.]

For example, here is an oil well drilling bit and those little hard metal items here are tungsten carbide cemented in cobalt. We know about the uses of those in different sectors of the economy. We are mindful also in our calculations of essential civilian requirements where some 25 mineral materials are essential to our agriculture.

NITROGEN, PHOSPHORUS, AND POTASSIUM ("N-P-K") ARE MAJOR FERTILIZER ELEMENTS. AT LEAST 24 OTHER ELEMENTS ARE ESSENTIAL TO PLANT, ANIMAL, OR HUMAN NUTRITION:

Boron
Calcium
Carbon
Chlorine
Chromium
Cobalt
Copper
Fluorine
Hydrogen
Iodine
Iron
Lithium
Magnesium
Manganese
Molybdenum
Nickel
Oxygen
Selenium
Silicon
Sodium
Sulfur
Tin
Vanadium
Zinc



Right now, sir, the Commerce Department, the Agriculture Department, and the Interior Department are working with the National Feed Ingredients Association to make sure that trace elements that permit 3 million farmers in this country to grow enough food for 239 million people and have an exportable surplus are available in time of emergency.

We have people like that working with us in our executive reserve system.

The type of data that study looked at, sir, included information like this:

1828

The Library of Congress Cataloged This Serial as follows:

U.S. Bureau of Mines
Mineral Facts and Problems. 1956—

Washington, U.S. Govt. Print Off.
v. illus., tables. 27 cm (*Its* Bulletin)

1. Mines and minerals resources—U.S. 2. Mineral industries—U.S.
I. Title. (Series)

TN23.U4 338.2 56—60859 rev TN23.U425
Library of Congress (r81x5)

BUREAU OF MINES
BULLETIN 675

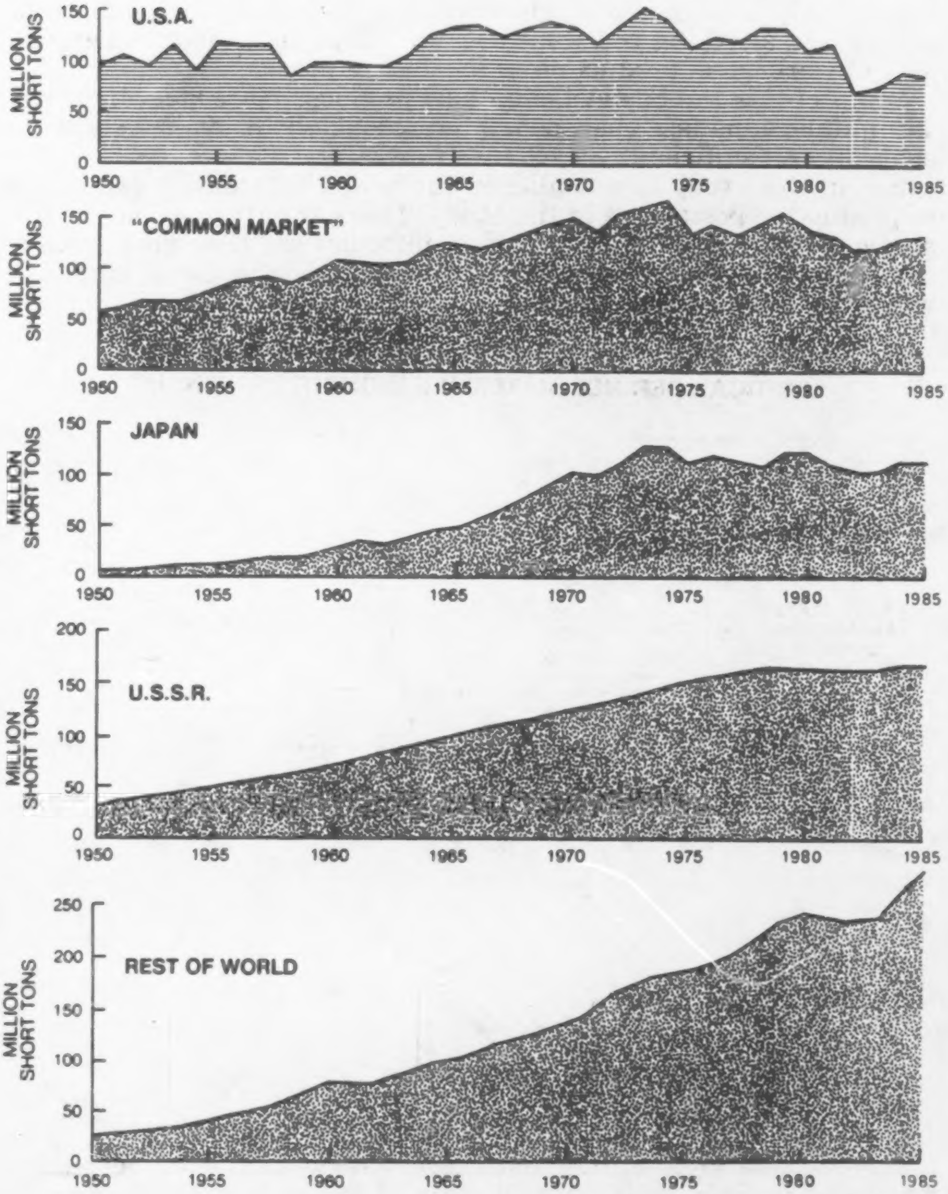
MINERAL FACTS AND PROBLEMS

1985 Edition

By the Staff,
Bureau of Mines

UNITED STATES DEPARTMENT OF THE INTERIOR

WORLD STEEL PRODUCTION



BUREAU OF MINES U.S. DEPARTMENT OF THE INTERIOR (Data from American Iron and Steel Institute)

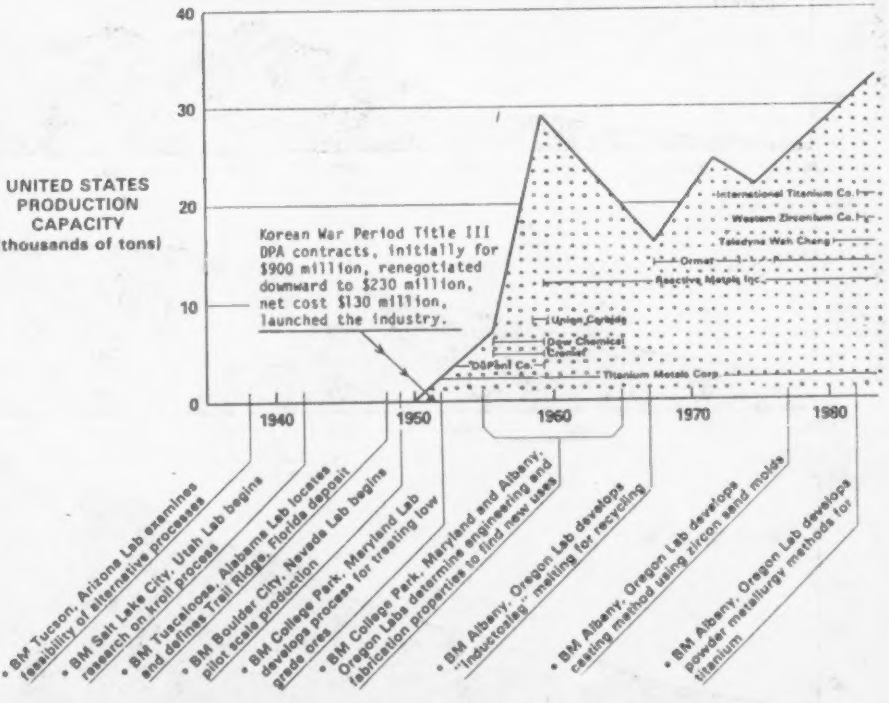
World steel production. If I can take just a moment to explain the significance of this, in the Korean war period world steel production was of the order of 200 million tons. Today the capacity is of the order of 800 million tons.

The United States has not grown anywhere near in proportion to the rest of the world. What this chart indicates, sir, is that there are ample supplies of raw minerals in the entire world. There have been plenty of manganese, chromium, nickel, vanadium, tungsten, columbiun, anything you want to name, to permit a fourfold expansion of world steel production in a 3-decade period.

In all of this the Soviet Union now produces more steel than we, 170 million tons last year, compared to our about 90. They are essentially self-sufficient.

Sir, in this study it was alleged there was substantial expansion of production postulated in the study. There is only one item in the study, if you look at the classified information, that postulates a substantial increase of production and that is the metal titanium which has been earlier referred to.

HOW BUREAU OF MINES RESEARCH ESTABLISHED A CRITICAL DEFENSE MATERIALS INDUSTRY: TITANIUM

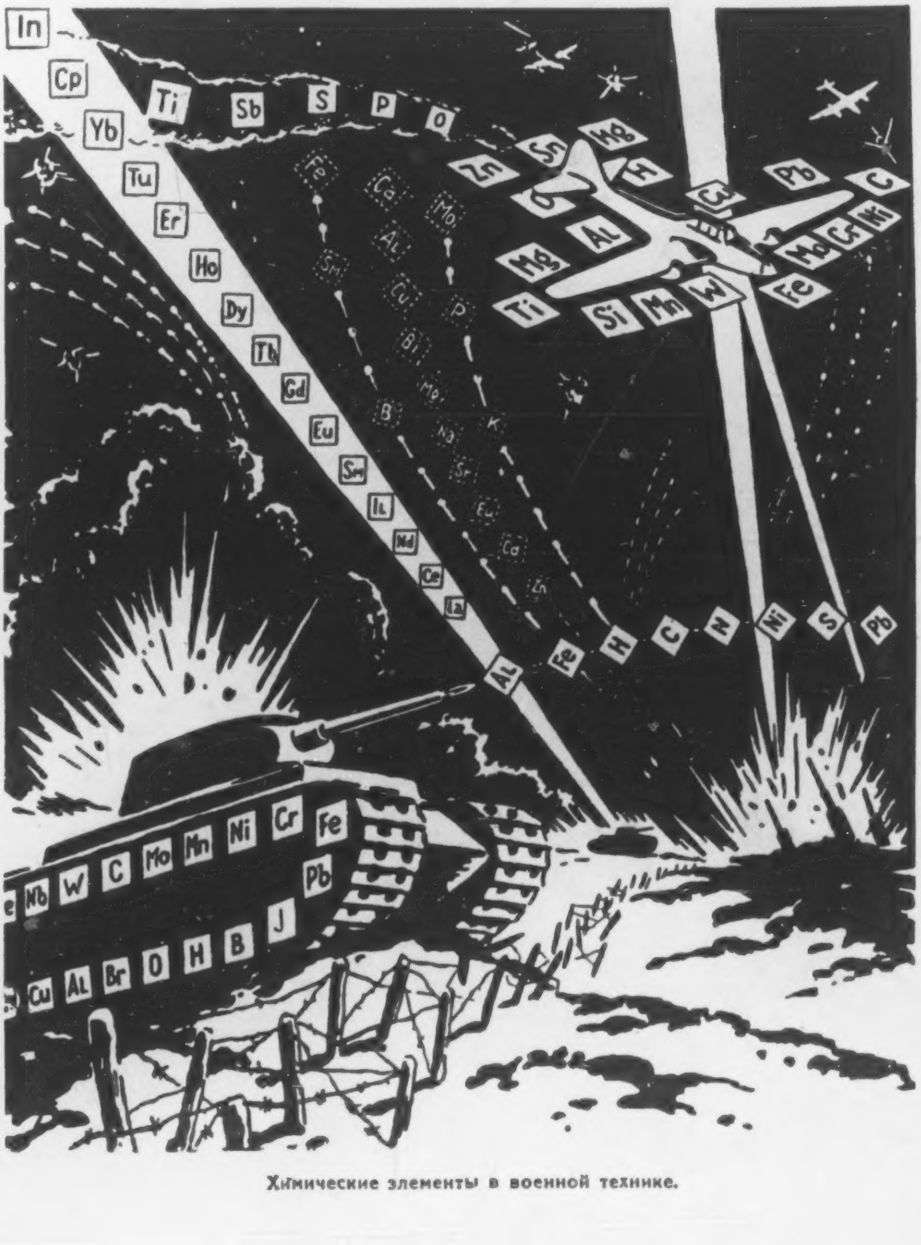


I would like to point out that there was no such thing as titanium metal until in 1950, after 10 years of research by the Bureau of Mines, under the Defense Production Act, the act I referred to earlier that, in my opinion, is critical to this entire process, the Government made 800 million dollars' worth of contracts to take a metal from a laboratory curiosity to nearly 30,000 tons of capacity as a result of requests from Wright-Patterson Air Force Base when General Metzger came in, in the early fifties saying they needed titanium because titanium was twice as heavy as aluminum, but was six times stronger, and hence has a 3 to 1 strength-weight ratio in its favor plus having a higher melting point.

In just a few years in the Korean war period with all the other stresses, we raised production from zero to 30,000 tons a year. Today we have 33,000 tons. The NSC study postulates a doubling of that to 65,000 tons by the third year of the war, given 1 year of warning and war years 1, 2, and 3. That is the only major domestic expansion postulated in the study.

I would like to point out that we are working very closely with the joint aeronautical materials activity at the present time to identify a number of materials not even on the stockpile list. There are many antique items on the stockpile list.

Someone earlier today referred to the cordage fibers, sisal, and some of the tanning materials and quebracho and the wattle.


In
Cp
Yb
Tu
Er
Ho
Dy
Tb
Gd
Eu
Sm
Il
Nd
Ce
La
Ti
Sb
S
P
O
Fe
Ca
Mo
Al
Sm
Cu
P
Bi
Mg
B
K
Na
Sr
Eu
Ca
Zn
Zn
Sn
Hg
H
Cu
Pb
C
Mg
Al
Mo
Cr
Ni
Ti
Si
Mn
W
Fe
Al
Fe
H
C
N
Ni
S
Pb
Nb
W
C
Mo
Mn
Ni
Cr
Fe
Pb
Cu
Al
Br
O
H
B
J

Химические элементы в военной технике.

We are working with the joint aeronautical materials activity and on scenarios with the Europeans, and so forth, on the very type of material needed for the Stealth aircraft and other materials which are the weapons of the future rather than the weapons of the past.

All of this information was put into the study, gone over by our subcommittee, cleared by the policy group that Mr. Maguire referred to, contained in the study then which went eventually to the Cabinet.

Senator HUMPHREY. Thank you.

Mr. **Maguire**. Mr. Chairman, from that world supply situation the second part of the analysis considered the political reliability of the various countries and a group from State Department, CIA, Defense Department, put together some conclusions that showed what the political reliability would be during this period of time.

Then following that, a Navy-led study of shipping losses was conducted. I would like to ask Capt. Ralph Buck to describe that.

STATEMENT OF CAPT. RALPH BUCK, U.S. NAVY, DEPUTY DIRECTOR, RESOURCES AND POLICY EVALUATION, OFFICE OF THE ASSISTANT SECRETARY OF THE NAVY (SHIPBUILDING AND LOGISTICS) DEPARTMENT OF THE NAVY

Captain **Buck**. Mr. Chairman, I appreciate the opportunity to explain to you very, very briefly some of the analysis that went into deriving the attrition that was used in the study.

National Defense Stockpile Study Task 7—Sealane Attrition

Team effort: OSD, OJCS, MarAd, OMB, Navy.

Authoritative derivation: OSD/OJCS Sealift Study (1984); Navy/MarAd mobilization studies (1984, 1985).

National intelligence estimate November 15, 1982.

I should like to stress it was in fact a team effort. We had representatives of the Office of the Secretary of Defense; Office of the Joint Chiefs, referred to earlier when we talked about the scenario development; the Maritime Administration; the Office of Management and Budget, National Security Division; and, of course, Navy.

We had a rather authoritative and fortuitous derivation because the Navy and Maritime Administration in particular had completed, about the same time this study was getting underway, some very detailed campaign simulations and attrition analyses in the context of a scenario that was almost an exact match for the scenario used in this study.

The Office of the Secretary of Defense and JCS Sealift Study, which the Navy participated in, was completed in 1984. Most of the attrition analysis on a worldwide campaign, global warfare, conventional warfare basis was done in the context of that study.

We derived many of our assumptions for this study from that. Also, the Navy and Maritime Administration mobilization base studies primarily concentrated on shipyard damage and sinking estimates which further explained what we had done in the Sealift Study.

Finally, all of this was tied together by very, very detailed and nationally agreed to, intelligence estimates that came out of these intelligence estimates listed here.

We had several critical assumptions. There are many more described in the report itself.

The first one referred to something that was mentioned earlier in the context of Cuba. That was mentioned several times. [Deleted.]

This was based on a secret study completed by the Commanders-in-Chief about 3 years ago.

Another critical assumption on which we have been criticized is that the U.S. ports were not mined. I would like to remind you that there is extensive organization in place between the Coast Guard and the Navy to look at the maritime areas of responsibility to try to keep that from happening.

However, that could be a point that we would be sensitive on. For the purpose of this study, the U.S. ports were not mined. Foreign ports we looked at critically could be.

Also, I would like to point out that the scenario postulated a worldwide distribution of forces. We are not saying that if the Soviet Union wished to, they could not concentrate in fact on one particular sealine of communication as the Germans did in World War II when they came to our east coast and the Caribbean when we were totally unprepared to handle the submarine threat.

In the context of a global scenario, the 600-ship Navy, we believe, can meet the Soviets wherever there will be a threat, particularly with sealines of communication.

[Deleted.]

Therefore, they would be subject, as usual, to going back to home ports and also their supply lines would be subject to attack. We did, in fact, analyze that.

Personally, I do not feel there is going to be very much economic shipping attrition during a war of this type. Most of it is going to be to the military: overseas shipping to fight the war itself. [Deleted.]

In the context of this study, we agreed as a worst case analysis [deleted].

In that context our results were derived. Also, finally, we derived some yearly aggregate attrition figures. We do not believe that this particular kind of scenario would lead to a continuous type of war the way we had in World War II.

In World War II there were, in fact, approximately 10 different submarine campaigns, all of different character and generally focusing in different areas of the world as the war progressed. There was not just one World War II, of course.

We also analyzed in the context of campaigns that were developed. Therefore, we do not believe it would last the entire 3-year period of time. Therefore, if we are going to take yearly aggregates, we would have to weigh them with the number of months the fighting would take place and we did do that.

The major findings. We did find one point of similarity with World War II. Our distinguished colleagues in the civilian sector have pointed out Mr. Santyana's quote.

We also found one of his quotes to be useful, the one that says: "History is always wrong and, therefore, always needs to be rewritten."

We found, however, there is one statistic that does not need to be rewritten. If we sail shipping to a threat area, you can expect to receive about [deleted] attrition. For the entire 5¾ years of World War II that is what the attrition rate was, approximately [deleted].

In our analysis with today's modern weapon systems on both sides and the way the deployment developed, we expect also to have approximately [deleted]. I found this out as a rather fortuitous point. We did not set out to try to prove that. It just happened.

The sea campaign lasts for a short period of time in the present estimate of what the war would be at sea as opposed to the longer campaigns and the slower submarine transit times that we had in World War II.

On balance, however, the maximum average yearly attrition rate we found for the economic portion of the overall attrition rate in years 1, 2, and 3 were [deleted].

We felt this was the worst case analysis in terms of economic shipping. Just to be on the safe side, the joint committee dealing with attrition, and the group that was looking at what the overall requirement might have to be to replace or to sustain these losses took [deleted] the attrition calculations for on the stockpile requirement on those which is far in excess of what our detailed analysis was.

Therefore, we feel that the requirements based on the study results are very, very conservative.

Thank you very much.

Mr. **Maguire**. Senator, in the interest of preserving your time and just talking about the areas that you would like to review, I am going to make available the details of any of the additional analysis you would like to hear and summarize the results that were formulated by the study. [Deleted.] One should note that that 4 billion dollars worth of materials is stored and maintained by the Government today and the carrying cost for that, if one assumes a 10 percent interest rate, is on the order of $400 million per year.

I think those people who are looking at this stockpile survey as something that is brand new should look at these figures. Something can be done to reduce the Federal deficit by perhaps agreeing on this area of surplus stocks and sale of those surplus stocks and how it would help the overall deficit.

[Deleted.]

Mr. Chairman, we will be pleased to respond to any questions you might have about this process.

In summary, I think the administration policy is clear. We believe that the process of goal determination has to be one that is classified due to the nature of some of the studies that have been presented.

We believe that to continue to spend $400 million a year on carrying charges alone for excess materials in the stockpile is an inappropriate use of funding at this time, and we believe that the President's modernization proposal will result in a turnover in the stockpiles to rid ourselves of some of the stocks that are no longer needed based on this analysis.

We can go about the process of getting some of the exotic materials that are now needed in the stockpile.

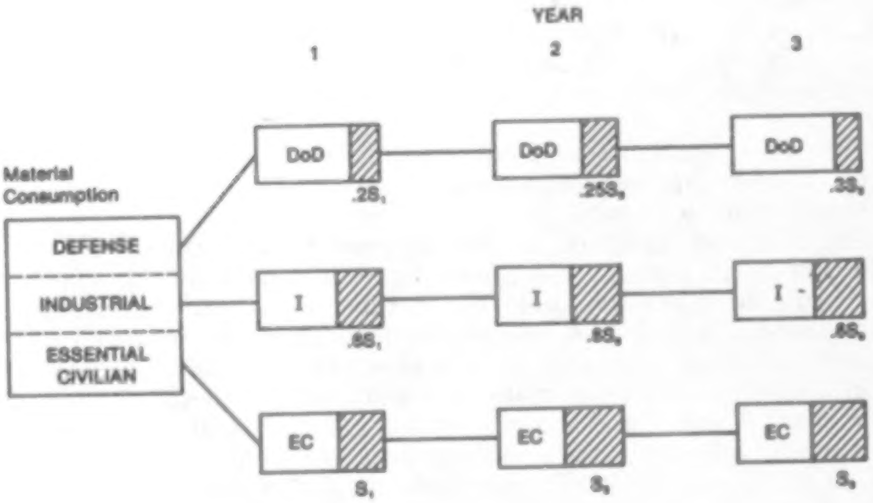
Also, if I could, I would like to clarify a point about the substitution at this point. I would like to ask one of our experts here, Mr. Farb, to talk about that earlier testimony.

STATEMENT OF WARREN FARB, SENIOR ECONOMIC ADVISER TO THE UNDER SECRETARY OF COMMERCE FOR ECONOMIC AFFAIRS

Mr. **Farb**. Thank you.

Earlier some references were made to the substitution of one material for another within the demand requirements by tier and industry.

Technical Substitution



No substitution of stockpiled material for stockpiled material allowed.

This chart summarizes the procedures we followed in allowing for substitution by tier: Defense, industrial, and essential civilian.

To start with, we only allowed substitution in those cases where experts from the Department of Commerce industry analysis group, Department of the Interior, or in some cases Department of Defense assured us that the technical means of making these substitutions were possible.

Second, we never allow any substitution of one strategic material for another.

Then, in addition to those safeguards, we only allowed full substitution up to the technical constraints for the essential civilains here.

For the industrial tier we allowed 60 percent of the maximum possible substitution in the first year, increasing to 80 percent in the second and third years.

For the defense tier, which we viewed as being the most important to the national security, we never allowed more than 20 percent of the maximum allowable substitution.

Mr. MAGUIRE. Mr. Chairman, we will be pleased to answer any questions you might have.

[The prepared statement of Mr. Maguire follows:]

PREPARED STATEMENT BY HON. BERNARD A. MAGUIRE, ASSOCIATE DIRECTOR FOR NATIONAL PREPAREDNESS PROGRAMS, FEDERAL EMERGENCY MANAGEMENT AGENCY

Mr. Chairman and members of the subcommittee, thank you for this opportunity to testify in exceutive session on the subject of the interagency review of the goal determination methodology for the National Defense Stockpile which led to the President's modernization proposal for the stockpile.

With your permission, I shall provide an overview of the study framework and policy reforms introduced in the conduct of the study. I will then describe the specific analytical elements and the major findings of the study. I will conclude with an explanation of the presidential decision on policy for the stockpile which were based on the study.

I am accompanied today by representatives of the major agency participents in the stockpile study, who will serve as supporting witnesses for this session. They are: The Honorable Thomas G. Moore, member of the Council of Economic Advisers; Capt. Ralph Buck, USN, Deputy Director of Resources and Policy Evaluation, Office of the Assistant Secretary of the Navy for Shipbuilding and Logistics; Mr. David Tarbell, Director of International Economic and Energy Affairs, Office of the Assistant Secretary of Defense for International Security Affairs; Mr. Gordon Jones, Chief, Division of Industrial and Strategic Materials, Bureau of Economics, Department of State, Dr. John D. Morgan, Chief Staff Officer of the Bureau of Mines, Department of the Interior; and Dr. Warren Farb, Senior Economic Adviser to the Under Secretary of Commerce for Economic Affairs.

The National Defense Stockpile is a reserve of dozens of different, nonfuel materials that the country would need in a war. The stockpile is meant to provide those materials the United States would require but that could not be supplied in sufficient quantities from domestic or reliable foreign sources during war.

The origins of the National Defense Stockpile predate World War II. The bulk of the stockpile was built in the 1950's, based on a 5-year conventional war scenario. In the 1960's, some materials were sold from the Stockpile based on a new 3-year war requirement. The Nixon administration further reduced the stockpile and based needs on a 1-year war. The Ford administration went back to a 3-year war scenario. The Carter administration restudied the issue and updated the Ford planning—this became the 1979 goals. These goals are in effect at present.

In 1979, a law was passed by Congress to ensure that stockpile goals were based on a 3-year war and that the receipts of the sales of surplus materials would only be used to buy needed materials rather than to balance the budget. Before the 1980 election, considerable attention was focused on the stockpile's size and composition. The Reagan transition team recommended new stockpile purchases; however, planning for these purchases predated the present administration. From 1981 to date, the administration has procured or has authority to procure about $600 million of materials. Planned sales of surplus stockpile materials during this period have amounted to less than $400 million.

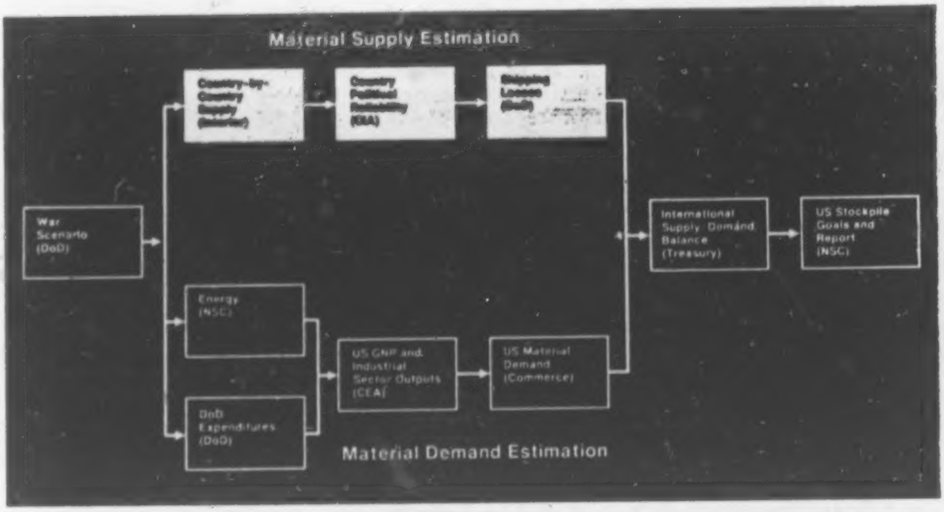
In late 1982, the NSG began an independent study of the stockpile. In July 1983, the Secretary of the Treasury, Director of OMB, and Chairman of the Council of Economic Advisors requested the National Security advisor to undertake a comprehensive study of the stockpile. This request was prompted, in part, by the stockpile goals methodology being applied in Section 232 trade cases to determine the adequacy of domestic industries for wartime expansion.

In August 1983, the NSC began the 1984 Stockpile and industrial Mobilization Preparedness Study. This study led to a number of Presidential decisions on policy for the National Defense Stockpile. This summary is an overview of the NSC stockpile study and the Presidential decisions that resulted. The NSC study covered the 42 most significant materials in the stockpile. The remaining 20, many of which are agricultural in nature, will be studied later, as will new high technology materials.

The calculation of the Nation's wartime material requirements requires the definition of key sectors of America's economy and war machine in an all-out conventional war. In the 1984 stockpile study, as Chart 1 shows, the interagency study team started with an approved Department of Defense [DOD] war scenario and then calculated expected materials supplies to the United States and contrasted these supplies on a material-by-material basis with U.S. demands. This methodology is similar to the one used in 1979. It is in the quality of the inputs that the studies differ dramatically; for the 1979 study contains a number of analytic errors and inconsistent planning assumptions in economics, defense, and petroleum availability. In contrast, the 1984 study relied on 10 different interagency groups chaired by the agencies noted in this chart to develop the proper inputs using improved analytic methods.

Chart 1

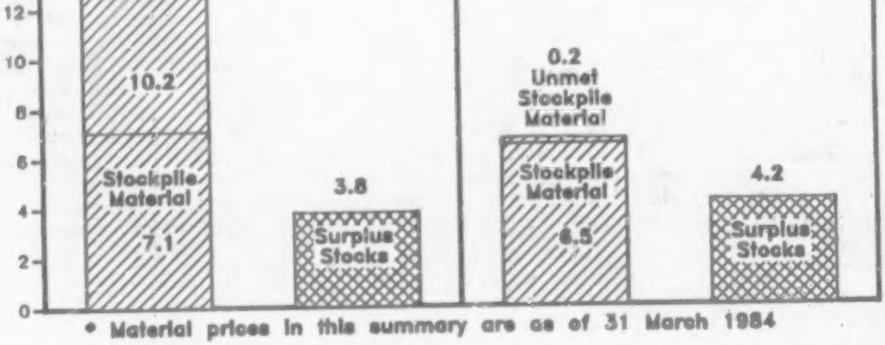
NSC Study Methodology, Tasks and Agency Participation


Material Supply Estimation
Country-by-Country Supply (Interior)
Country Political Reliability (CIA)
Shipping Losses (DoD)
War Scenario (DoD)
International Supply Demand Balance (Treasury)
US Stockpile Goals and Report (NSC)
Energy (NSC)
DoD Expenditures (DoD)
US GNP and Industrial Sector Outputs (CEA)
US Material Demand (Commerce)
Material Demand Estimation

In 1979, the previous administration calculated the U.S. stockpile needs—or goals—to be $17.3 billion, as shown in chart 2. Of these goals, the United States currently possesses $7.1 billion in materials. The United States also has an additional $3.8 billion of materials considered to be surplus to our requirements under the 1979 goals. Thus, according to the 1979 calculations, the U.S. Government is currently $10.2 billion short of meeting or stockpile goals.

Chart 2

Stockpile/Mobilization Study



* Material prices in this summary are as of 31 March 1984

Upon review of the extremely comprehensive NSC interagency study that took two years and thousands of staff hours to complete, the President determined that the 1979 goals greatly overstate U.S. materials requirements and that, in fact, a far smaller stockpile—a stockpile with a value of $700 million—would completely satisfy U.S. essential civilian, industrial and defense materials needs for one of the most materials-intensive types of war that can be envisioned—a protracted conventional global war. In addition to the new, smaller stockpile, the President has decided to maintain a supplemental reserve of $6 billion worth of the materials the U.S. Government already possesses. Thus, in the 1984 study, the administration is eliminating the $10.2 billion of unmet goals that dates from 1979 as it adopts, working with the Congress, a smaller, more efficient stockpile.

[Deleted.]

[Chart 3 deleted.]

[Deleted.]

As noted, the National Defense Stockpile is to provide materials for all our country's essential needs in wartime including civilian requirements. The interagency study team found, however, that the 1979 stockpile goals planned for a "guns and butter" world war in which the Govenment would ensure materials availability for near peacetime levels of production of such goods as cars for business and civilian uses; and, significant levels of residential housing and office building construction.

[Deleted.]

[Chart 4 deleted.]

[Deleted.]

Materials supply, both foreign and domestic, for the two studies is detailed in chart 5.

[Chart 5 and 6 deleted.]

[Deleted.]

[Chart 7 deleted.]

[Deleted.]

[Chart 8 deleted.]

These four bulletproofing steps provide the 1984 study with a tremendous degree of conservatism and redundancy in the goal determinations.

Chart 9 summarizes the President's stockpile decisions: Set up a two-tiered stockpile.

Tier one to be derived from the NSC study; and

Tier two to be the supplemental reserve; to be kept so as not to disrupt the markets of foreign or domestic materials producers and to provide for a tremendous margin of safety if we change our war planning assumptions in the future.

The $700 million stockpile and the $6 billion supplemental reserve contain over 1½ years of peacetime levels of imports of such materials as chromium, manganese, and cobalt. These materials are those generally considered to be the most susceptible to a peacetime supply disruption. Thus, the supplemental reserve effectively safeguards the U.S. economy against the unlikely event of a peacetime materials disruption. The stockpile of $6.7 billion is 94 percent of the value of the goal materials the U.S. Government possesses today.

Under the President's plan, the United States would sell about $500 million in surplus materials a year. The actual sales would be determined based on an interagency review involving the Departments of State, Commerce, and Interior, as well as other concerned agencies.

The receipts realized from this sales program would be used to buy any needed materials, including possible high-technology materials, previously not studied or considered for stockpiling; the residual will go to help offset the deficit.

The stockpile methodology will be applied in other appropriate mobilization preparedness areas.

Important follow-on tasks were authorized.

Chart 9 concludes the overview of the study and summary description of the President's stockpile modernization proposal. We will be happy to provide answers to questions and further details on any of the elements of the study and the modernization policy.

CHART 9

PRESIDENTIAL STOCKPILE DECISIONS

A. CREATE TWO-TIERED STOCKPILE

TIER I -	STOCKPILE GOALS	$ .7 BILLION
TIER II -	SUPPLEMENTAL RESERVE	$6.0 BILLION
TOTAL STOCKS KEPT		$6.7 BILLION

B. SELL $2.25 BILLION OF REMAINING EXCESS MATERIALS

- OVER FIVE YEARS
- MINIMIZING MARKET IMPACTS

C. SALES REVENUES

- PURCHASE NEEDED STOCKPILE MATERIALS
- REMAINDER OFFSETS DEFICIT

D. STOCKPILE PLANNING ASSUMPTIONS

- USE IN APPROPRIATE MOBILIZATION PREPAREDNESS AREAS

E. FOLLOW-ON STUDIES

- NON-STOCKPILED HIGH TECHNOLOGY MATERIALS
- INDUSTRIAL MOBILIZATION BOTTLENECKS
- POTENTIAL EASTERN BLOC MATERIALS MARKET ACTIONS DURING CRISIS
- MARKET IMPACTS OF STOCKPILE DISPOSALS

Senator **Humphrey**. We have some questions which you may answer for the hearing record.

[Questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR ALAN J. DIXON

EXECUTIVE BRANCH AGENCIES PARTICIPATING IN INTERAGENCY STUDY

Senator DIXON. Mr. Maguire, what executive branch agencies participated in the interagency study that produced these new stockpile goals?

Mr. MAGUIRE. The agencies are:

Working group chairmen: War Scenario: Department of Defense; Defense expenditure levels: Department of Defense: Petroleum supply: Policy: National Security Council; petroleum scenario: Department of Defense; oil supply/demand/price relationship: Department of Energy; Macro-Economic Study: Council of Economic Advisers; Industrial output and investment study: Council of Economic Advisers; U.S. materials demand: Department of Commerce; world materials supply: Department of the Interior; political reliability of exporting nations: Central Intelligence Agency; sealane attrition: Department of Defense; international supply/demand balance and stockpile goals: Department of the Treasury.

Policy-level participants: Department of Commerce, Department of Defense, Department of Energy, Department of the Interior, Department of State, Department of the Treasury, Office of Management and Budget, Central Intelligence Agency, Council of Economic Advisers, and the Federal Emergency Management Agency.

Senior agency participants: Department of Commerce, Department of Defense, Department of Energy, Department of the Interior, Department of State, Department of the Treasury, Office of Management and Budget, National Security Council, Central Intelligence Agency, Council of Economic Advisers, and the Federal Emergency Management Agency.

ELIMINATING STOCKPILE GOALS

Senator DIXON. What was the Defense Department's position on your proposals to virtually eliminate stockpile goals?

Mr. MAGUIRE. The Department of Defense participated in the recent review of stockpile goals. The Department of Defense supports the President's proposal of July 8, 1985, to modernize the stockpile. This proposal would result in a $5.4 billion (March 1986 prices) stockpile of two tiers, including goals valued at $0.6 billion and a supplemental reserve valued at $4.8 billion.

AGENCY POSITIONS

Senator DIXON. What was the position of the Commerce Department and the Bureau of Mines on the results of your study?

Mr. MAGUIRE. The Department of Commerce participated in the stockpile goals study. The Bureau of Mines, Department of the Interior, also participated in the stockpile goal review. The Secretaries of Commerce and the Interior support the President's decision.

Senator DIXON. What was the position of FEMA and CIA on the results of your study?

Mr. MAGUIRE. FEMA participated in the stockpile goals study and supports the President's modernization proposal of July 8, 1985, for the National Defense Stockpile.

The CIA participated in the NSC study on the stockpile and supports the results of that study.

STOCKPILE GOAL CHANGES

Senator DIXON. Mr. Maguire, the current stockpile goals have supposedly been based on projected U.S. wartime industrial consumption, U.S. domestic production capability, and reliability of foreign sources.

What has changed in these three areas to warrant such a reduction in the Strategic Stockpile goals?

Mr. MAGUIRE. The basic changes in the most recent stockpile goals study is that we have used improved and more up-to-date data as well as more realistic assumptions and newer models to predict stockpile goals. These include:

Realistic estimates of maximum available petroleum supplies;

Use of a DOD model to project materials required for defense-related goods;

Realistic estimates of civilian austerity;

Rational assessments by the intelligence agencies on the reliability of material imports from other nations; and

Use of Defense Production Act Title III in wartime for domestic materials production.

The President's proposed goals are based on more realistic assessments of materials requirements and materials supplies that would be available to meet these requirements.

Senator DIXON. Have the projections of U.S. wartime industrial consumption changed?

Mr. MAGUIRE. The 1979 study failed to consider the dampening effect on the gross national product [GNP] caused by a reduced level of available petroleum imports during a global, three-year conventional war which would effect the major oil-producing geographical areas. The economy projected for the 1979 goals would have required massive increases in petroleum imports far higher than any previous peak year mainly for nonessential civilian consumption. The current study includes plausible levels of petroleum imports based on the war scenario and its effect on GNP.

The 1979 study assumed that the stockpile would be used to provide for what is considered to be high levels of nonessential investment and consumer goods production. The current study does not include stockpiling of materials by the U.S. government to guarantee material availability during a war for this type of consumption.

The decreased requirements for many materials are due to the use of a DoD model (DEIMS) to generate DoD's materials requirements. Overall, even though real defense purchases are larger in this study, materials requirements are only about two-thirds of those estimated in the previous study.

Senator DIXON. Has U.S. domestic production capability increased?

Mr. MAGUIRE. The study includes engineering estimates of the expansion of existing domestic production as well as concerted programs assuming wartime use of the Defense Production Act Title III for the development of domestic resources. The 1979 study did not assume use of Title III and under estimated U.S. domestic supplies.

Senator DIXON. Are the foreign sources on which we depend for these materials more reliable now than before?

Mr. MAGUIRE. In the 1979 study material imports were limited severely by the use of a complicated methodology using quantitative estimates of a range of variables that were neither plausible nor consistent to project the reliability of foreign suppliers. For example, for one country, high levels of oil exports to the U.S. were assumed while zero levels of material exports were assumed. The current study relies on the judgments of the intelligence agencies. A global approach was taken for estimating production, availability, and delivery of imported materials including the needs of our allies.

Senator DIXON. Mr. Maguire, a recent Bureau of Mines publication pointed out that "Centrally Planned Economies and Southern Africa produce about 75% of the world's supply of four critical minerals."

These four critical minerals are chromium, cobalt, manganese and the platinum group metals.

According to CRS, there is no stockpiling inventory goals for platinum group metals in the President's new proposal.

How do you propose that we ensure our ability to meet our industrial requirements for the platinum group metals, for example, when 48% of the world's supply is in the U.S.S.R. and 46% is in South Africa?

Mr. MAGUIRE. About half of platinum group metal use in the U.S. is in the automobile industry for use in catalytic converters. For platinum group metals, U.S. wartime requirements are significantly lower than U.S. peacetime consumption because nonessential civilian goods production, such as vehicle and jewelry production, are not included. In the administration's proposal, the U.S. Government would not stockpile materials for nonessential production during times of national emergency such as three year global conventional war. The Bureau of Mines estimates that the U.S. and Canada could greatly increase platinum group metal recycling. Thus, increased North American supplies would meet most essential national security requirements and would reduce U.S. dependency on Southern African supplies.

Senator DIXON. Mr. Maguire, in March 1981, President Reagan spent $78 million to purchase 5.2 million pounds of cobalt from Zaire for the National Defense Stockpile.

In announcing this sale, President Reagan stated that "It is expected that larger purchases will be made . . ."

According to CRS, the proposed new stockpile goal for cobalt would create an excess of 17.6 million pounds of cobalt in the current stockpile.

What has changed since 1981 when the President spent $78 million to buy cobalt?

Mr. MAGUIRE. President Reagan, in announcing this purchase on March 13, 1981, stated that these purchases are ". . . a step to restructure the existing $15 billion stockpile in critical areas of deficiency." The stockpile goals study was another step to make sure the Nation has the right materials in the stockpile if they are ever needed.

Several changes have occurred in the goal for cobalt since the 1981 purchases. First, projected requirements have decreased because materials for nonessential civilian goods would not be included in the stockpile. Second, projected U.S. supplies are higher because of the assumed use of the Defense Production Act Title III during the war. Third, the amount of cobalt used to produce items in the U.S. has declined substantially over the past 5 years because the increased price of cobalt in the late 1970's induced considerable amounts of substitution away from cobalt in the production process. Estimates of DOD's cobalt using DOD's estimating model are about two thirds of requirements estimated in the 1979 study.

In the case of cobalt, the shortages brought about by the 1978–79 unrest in Zaire and the resulting high prices for cobalt caused some consuming industries to seek substitute materials. In the three years following the unrest in Zaire, U.S. consumption declined an average of 33 percent. Further, the high prices prompted renewed interest in domestic mining of cobalt. Estimated U.S. reserves of 1.4 million tons could be economically mined at higher prices.

These changes in the study resulted in a new and more realistic goal for cobalt.

The recent acquisitions of cobalt for the stockpile will provide a proper mix of material in the stockpile to meet all critical applications. The purchases of cobalt in 1981 from Zaire were of high-purity electrolytic cobalt suitable for superalloy production for ultimate use in jet engine components. Prior to the most recent cobalt purchases, no cobalt of this purity was contained in the stockpile inventory, and, therefore, none of the stockpiled material was suitable for use in production of jet engine components. The pre-1981 cobalt is suitable for less critical metal-cutting tools. The reduced goal for cobalt which the administration is proposing will make available for disposal lower quality material not required for critical applications and uses for which substitutes are readily available.

Senator DIXON. If you are so anxious to dispose of excess materials in the stockpile, why hasn't the administration made an effort to dispose of the 136.5 million troy ounces that everyone agrees is excess to our strategic stockpile requirements?

Mr. MAGUIRE. The administration has vigorously pursued the disposal of silver from the stockpile. The administration requested authority in the fiscal year 1987 Annual Material Plan to dispose of 4.4 million troy ounces of excess silver in direct sales to the public. In addition, the Department of the Treasury estimates that 3.0 million troy ounces of silver will be used to mint the Statue of Liberty-Ellis Island Commemorative Coins. Finally, a one-ounce bullion coin will be sold beginning in September 1986. Pursuant to legislation, silver for both of the coins will come from the stockpile.

The administration proposes to sell unneeded stockpile materials, such as silver, without disrupting markets. It has requested that the Congress provide the necessary authority to allow the planned disposals to proceed.

Senator DIXON. Mr. Maguire, as the Associate Director for National Preparedness at FEMA, what is your view on the proposal to sell the Naval Petroleum Reserves?

Mr. MAGUIRE. There is little national security reason for the Government to retain the Naval Petroleum Reserves (NPR's). As Congress foresaw in 1975, the Strategic Petroleum Reserve is a much better emergency reserve because it can pump oil out at 3 million barrels per day—30 times faster than the NPR's can.

Senator DIXON. Mr. Maguire, in November of 1981, Defense Department officials testified before this Subcommittee that "The Naval Petroleum Reserves are an important strategic asset".

What has changed since that time to make the executive branch want to sell off "an important strategic asset?"

Mr. MAGUIRE. The administration and Congress have substantially increased the size of the SPR. Since 1980, the SPR has grown from under 100 million to nearly 500 million barrels of oil.

Defense petroleum needs are met primarily from the open market. Legislation was enacted in 1984 to simplify Department of Defense petroleum procurement.

Senator **Dixon**. Mr. Maguire, what is the current market value of the oil reserves contained in the Naval Petroleum Reserves?

Mr. **Maguire**. The President's fiscal year 1987 budget proposes selling the Elk Hills, California, and Teapot Dome, Wyoming, oil fields for its market value. At the time the budget was submitted a rough estimate of market value was $3.6 billion.

Senator **Humphrey**. Thank you very much. The hearing is adjourned.

[Whereupon, at 11:55 a.m., the subcommittee adjourned, subject to the call of the Chair.]

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